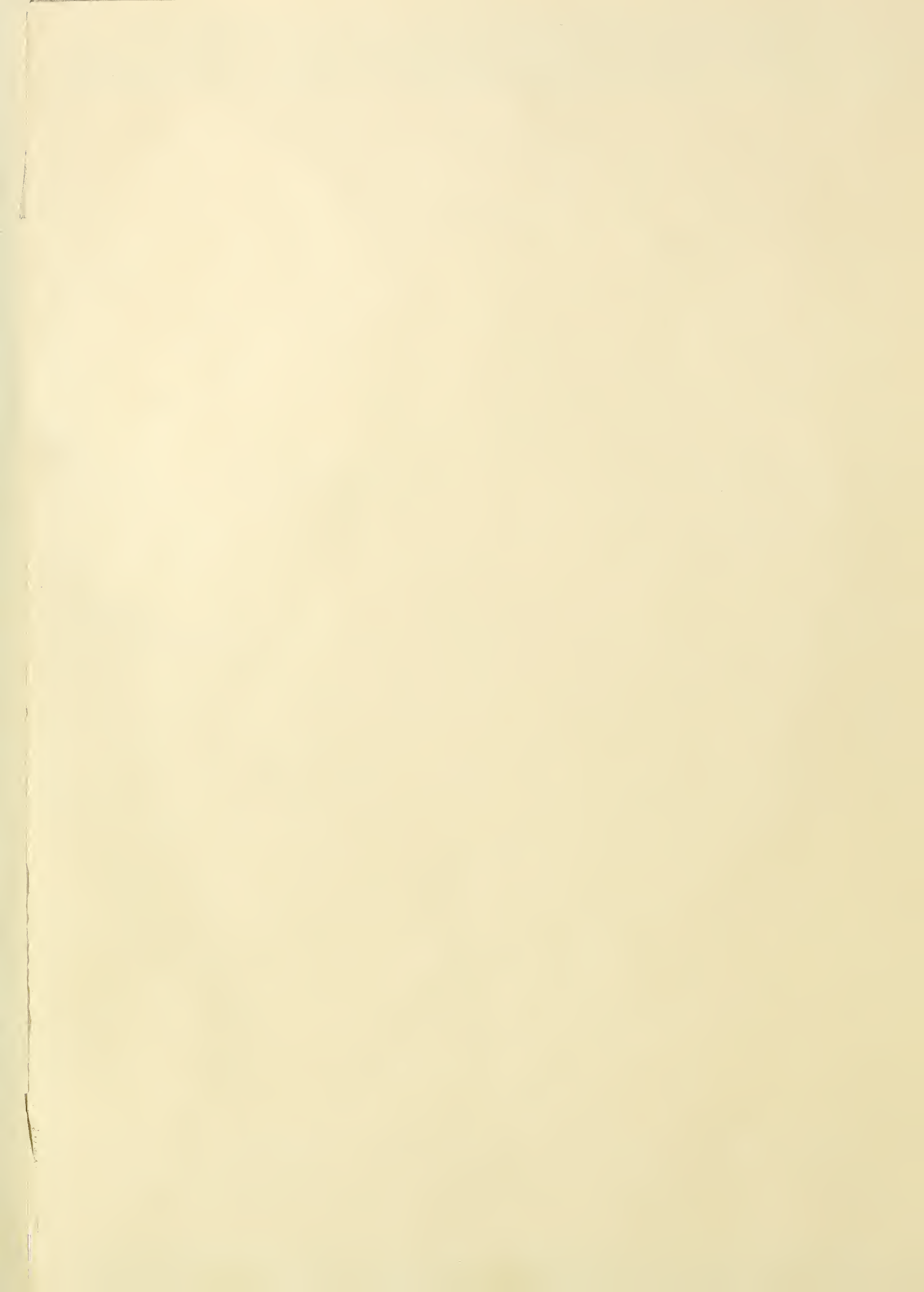


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BETTER FRUIT

VOLUME XV

JANUARY, 1921

NUMBER 7

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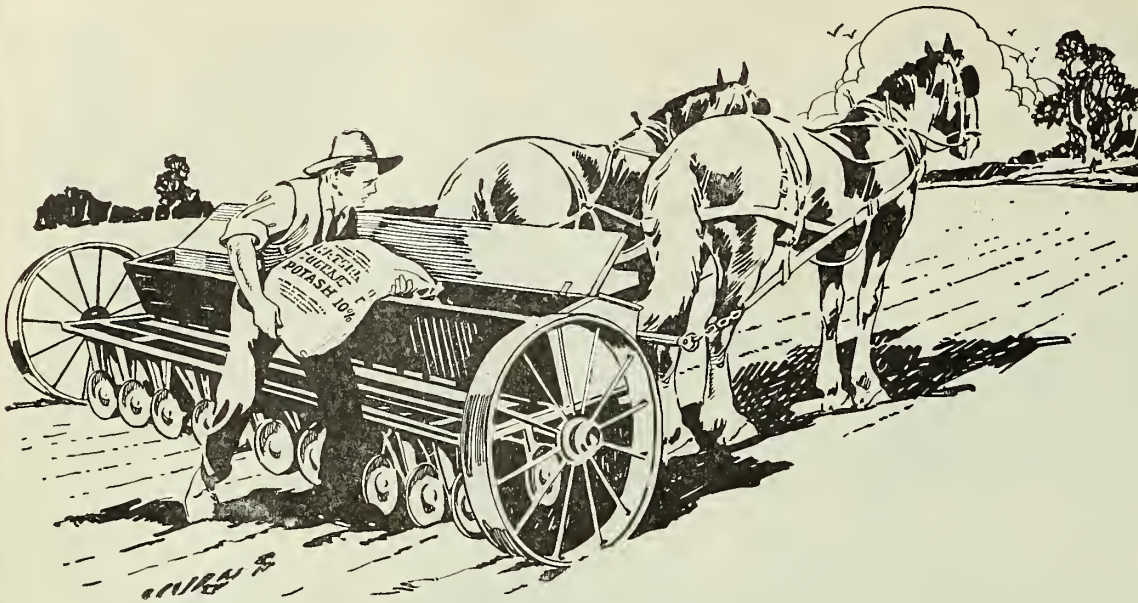
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Stock Influence on Scion—In Regard to Top Grafting

By A. E. Murneek, Assistant Professor of Horticultural Research, Oregon Experiment Station

THAT the two consorting parts of the graft, though remaining distinctly individual in their main characteristics, are reciprocally influenced by each other, has long been the subject of observation and study.

It is well known to most nurserymen that the scion or top of a grafted tree has a marked effect upon the stock or root system of the plant. This impression may be so profound and characteristic that varieties may be recognized by the root system formed, though the root be originally but a mongrel seedling. Unright growing varieties of apples of the Russian type, for instance, will form a correspondingly deep-growing root system, while those of the spreading Winesap type will be flat and shallow. This can be extended even to particular varieties. The Red Astrachan, Oldenburg, Fameuse, for example, form each a characteristic root system of their own. In this connection, Shaw believes that "the size or stoutness of the main branches is positively correlated with the size of the main roots and angle of the branch with the angle of the main roots and the axis of the tree. In many individual cases this correlation is obscure, yet careful observations with large numbers of trees will reveal it."

But it is not only the form of the root that is changed by the stock. The physiological modification brought about in the root may be effective enough to make it markedly different in hardiness and resistant to many external vicissitudes. To what degree of economic importance are these modifications can, however, only be conjectured.

The reverse of this, the influence of stock on scion, has been the subject of much more recorded opinions and observations than that of the scion on the stock.

English horticultural literature, especially the pages of the "Gardener's Chronicle," abound with plentiful and rich information on this topic. Though very scattered and more or less of a subjective nature, there is much material on this question recorded in the transactions of various state horticultural societies.

From the point of view of the fruit grower, the subject falls under two topics: First, the influence of the stock

on the scion proper, and, second, the indirect influence on the fruit.

Influence of Stock on the Tree.

The ways in which the scion may be modified by the stock may be in respect to—

1. Form and size of the plant.
2. Vigor of growth.
3. Health.
4. Hardiness.
5. Productivity; precocity.
6. Time of blossoming and maturing of fruit.

Some of these may not be directly traceable to the stock, but rather the secondary results of one or more of the above effects. Thus many of the modifications stated above may be due to increased vigor of the plant. Again, productivity is often directly dependent upon health and so is longevity. These in turn may be closely connected with hardiness.

That the stock has a marked and characteristic influence on the scion in respect to form and size of the tree is well illustrated in the common practice

of producing dwarfed trees by growing standard varieties on dwarf or dwarfing stocks. The apple on Doucin or Paradise stocks, the pear on the quince, the cherry on Mahaleb are but a few familiar examples.

1. The diminished size in most cases of dwarfing is due to a lack of supply of raw material to the scions, or a partial starvation. The cause of this may be attributed either to the particular character of the stock or, in some instances, to the imperfections and constriction of conducting vessels at the point of the graft union. In many instances, however, the scion partakes of the character of the stock to an extent which cannot be ascribed to the diminishing of food supply alone, but rather to some more specific and more profound effect brought about by a selective influence of the protoplasm.

2. As the stock has a tendency to impart its characteristics to the scion and as the commonly used stocks for top working are more vigorous than the scion, we can expect thus an increase in vigor of the top grafted tree. That many varieties of apples have been changed in vigor because of top grafting we have not only individual but also cumulative evidence, as will be seen below. In most instances vigor has been increased by top working, especially with such weak growing varieties like Grimes, Winesap and others. In an investigation of the adaptability of various stocks for the American grape, Hedrick reports that all top grafted vines are more vigorous than when grown on their own roots, ascribing this to the existence of a high degree of congeniality between the stocks and varieties under test.

The general cause of increase in vigor of top grafted trees may be due either to an increased supply of sap or raw material by the more active or faster growing stock, or due to some specific influence, which is of mutual benefit to both the stock and scion, and is often covered in a loose and general way by the term "congenial." That many varieties are made more vigorous when grafted on a particular stock (not necessarily of more vigorous growth) has long been an observed fact among practical horticulturists, though the reason of this effect is not known. Most ap-

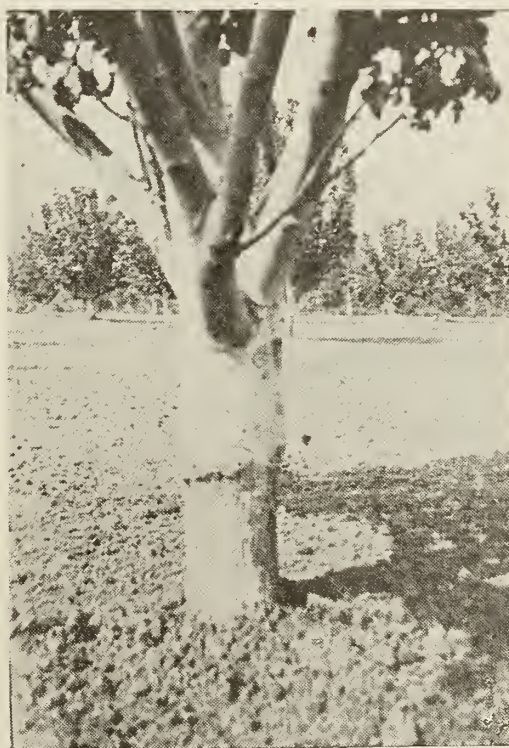


Fig. 1. Comice pears. Scions overgrowing stock. Such differences in growth must have some effect upon the performance of the tree.

parently there is a beneficial interchange of vital substances in at least the cases of certain congenial grafts, causing a stimulation and increase of activity of the scion. In this respect botanical relationship seems to play a lesser part than similarity of habitat of the two consorts.

A decreased vigor as a direct result of top grafting can just as easily take place, as was considered above.

3. An increased vigor may carry in its trail a number of benefits which are directly dependent upon vigor. The most important of these is most probably the general health of the tree. The comparative resistance of the stock and scion to parasites and injurious organisms, especially many fungus diseases, may make a variety more immune or resistant to certain diseases when top grafted on particular stocks. To what extent this is a direct acquirement or a secondary result due to a general increase in vigor is still an open question. A general improvement of the tree's health by top working because of a substitution of the roots, stem and even parts of the scaffold branches by a variety of known hardiness of immunity to particular troubles has been considered previously.

A desired stock may, however, transmit or impart a disease to the scion. This is said to take place, for instance, when stocks infected with peach yellows or little peach is budded with healthy buds; so also when blight infected stocks of the apple or pear are used.

4. In many sections of the upper Mississippi Valley the practice has become well established. Horticultural literature of the prairie states abounds with information on observations where hardiness has been increased by top grafting.

In almost all of these cases under hardiness has been meant the resistance of the variety to low temperatures.

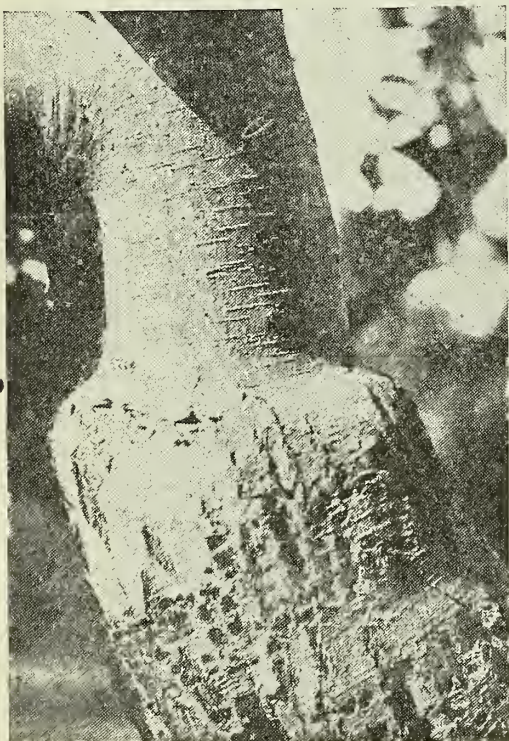


Fig. 2. A close view of union of stock and scion of a top-grafted tree.

The question as to the degree and amount the scion may be influenced by the stock is, however, not known. There is much information on hand, however, which shows most clearly that the top of a tree has been affected by the hardy stock; that trees have been saved from being killed by low temperatures because of the hardiness of their roots. Of course, a very extreme frost, such as frequently occurs in the northern-most states and in Canada, will kill a tree in spite of the increased resistance to cold.

5. Top worked trees are commonly more productive and usually more precocious. A top worked tree will come into bearing two to four years earlier than when the variety is grown on its own roots. This is natural, because of the supply of an already well developed root system and frame work to the scion, which then makes a more rapid growth and reaches the bearing age much sooner. Not only early bearing, but also fruitfulness is increased by top working. Weak growing varieties will be made more fruitful because of the increased vigor as a result of the use of a more vigorous stock. Varieties that make a rapid and luxurious wood growth, especially during the first few years, will be made more productive when top worked on less vigorous stock or on one with which a more or less imperfect union is made. In both cases a diminished supply of sap from the stock will tend somewhat to weaken the top and make it more productive. This can be set down as a general rule not only in cases of top grafted apples, but also with those of most other fruits. After many years of experimenting with top grafting of grapes, Hedrick found that grafted grapes have larger yields than those on their own roots.

6. That the time of blossoming and maturing of fruit is often altered as a result of top grafting, has been frequently observed by fruit growers.

After much observation and experience with many varieties of apples, Budd of Iowa concluded that "there is much evidence that winter sorts of apples ripen prematurely when top grafted on Oldenburg or Whitney.

Again, the blossoming time of the scion is frequently affected by the stock. The differences in this respect have been noted to be from a few days to a week or more.

Hedrick reports of a case that has come to his observation, where a whole orchard of McIntosh top grafted on Oldenburg matured fruit two weeks earlier than McIntosh on standard stocks.

As in the case of maturing of the crop, so with time of blossoming, hastening or retarding in either case will depend mainly upon the difference in length of the growing season with different varieties used for stock.

7. In respect to longevity of top grafted trees, observation seems to be quite at variance as to whether top grafting in general increases the longevity of the tree. Hedrick believes

that it is almost a rule that weak growing varieties when grafted on vigorous stock will result in short lived trees. The use of a hardy variety for stock will in most cases insure a longer lived tree. This would be especially true if top working is done on the branches instead of the main trunk, for this would insure hardiness and health to the most vital part of the tree. Varieties that are especially subject to various root troubles and to diseases of the crown, trunk or crotches would be insured a longer life.

In the case of many congenial varieties there seems to be a direct benefit derived from top grafting as a result of the differences of physiological changes in the stock and scion, which may act in a beneficial and stimulating way and thus increase the longevity of the top grafted tree. In what specific way this is brought about is still an unsolved question. The common information on this and many other influences of the stock on the scion are largely of an empirical nature. In order to learn what are the present opinions of experienced horticulturists regarding the beneficial influence exerted by the stock on the scion, the writer, while a staff member of the pomology section of the Iowa Agricultural Experiment Station, solicited in 1918 the opinions of a large number of the most prominent growers and nurserymen of the United States and Canada. It was asked in a questionnaire as to whether observations and experience have led to the belief that top grafting the apple on hardy and disease resistant stock has influenced the vigor, hardiness, productivity, health and longevity of the tree. The following answers were received from a total of close to a thousand solicited:

Scion has been made	Yes	No
More hardy.....	55	12
More disease resistant.....	48	10
More vigorous.....	51	10
More productive.....	52	12
Longer lived.....	48	11
Total.....	254	55

From the above answers it is evident that while 82.2% of the total replies asserted that the scion has been benefitted in all of the above respects, only 17.8% are of the contrary opinion. This is especially true in respect to hardiness and an increase in vigor and productivity of the top worked trees. This cumulative evidence is self-assertive and extensive enough to give additional emphasis to the benefits derived from top working.

Influence of the Stock on Fruit.

The indirect influence of the stock on the scion, expressed in changes of character of the fruit, may be in respect to—

1. Modification of color of the fruit.
2. Changes in size.
3. Changes in respect to eating and keeping qualities of the fruit.

As in many instances it is almost next to impossible to ascertain in what respect and to what extent the above

Continued on page 34.

Off-Year Apple Bearing

By R. H. Roberts, Wisconsin Experiment Station

BIENNIAL bearing of apples is so common in the eastern part of the United States that this condition is generally accepted as being a fixed tree habit. It is believed, however, in view of observations of fruiting conditions in typical orchards and of the results of experimental trials that off-year bearing is due to nutritional conditions and that it is consequently subject to modification. This present discussion deals with these observations. It is taken as significant that several varieties in a number of states which are ordinarily biennial in habit, were regular in bearing when proper growth conditions were secured.

Because of its economic importance any discussion of the off-year problem in the East should deal primarily with methods of relief. The interest of Pacific Coast growers doubtless lies more in the matter of prevention. Whatever the viewpoint, a review of the underlying principles, insofar as they have been developed, should be given as a basis for an appreciation of the suggestions as to control measures.

The present discussion is based upon information collected in the East. It is recognized that the amount of growth in the average eastern orchard is much below that of western ones. Data from experimental plats show that eastern trees have an average terminal growth of four to ten inches. What appear to be comparable experiments on the Pacific Coast, as at Hood River, show plat averages of nearly double this length.

This difference in growth conditions is offered as an explanation of the apparent differences in the tendency to irregular bearing in the two sections, rather than being an argument that the conditions are different and that the suggestions based upon eastern data have no bearing outside of the East. If a similar growth was obtained similar results would follow in both localities. When viewed from the standpoint of the relation of growth to fruitfulness, there is no apparent lack of application of the results secured. Observations made by the horticultural department of the Oregon Experiment Station show that the relations between growth conditions and blossom bud formation are very similar to those which have been found to prevail in the East. It is hoped that the observations may be extended to the orchards of the western coast soon, especially in view of the off-year tendencies of Newtown and Spitzenberg.

A popular theory regarding biennial bearing is that this condition is due to the over production of fruit. This is not necessarily true as many biennially bearing orchards produce light crops, even though they bear only every other year. The theory is not without foundation, however, as an off-year is quite sure to follow an extreme production of blossoms, which is usually accompanied by a heavy yield of fruit. This is because spurs do not regularly blossom

two years in succession even though no fruit was matured the first year. As a rule, if all the spurs blossom one season, they all miss the next. It is rare that an old bearing tree matures fruits on many more than one-half of its spurs during any one season. In such cases the fruits are generally small and of poor quality. A full crop can result with a third of the spurs blossoming. In fact there is an inverse ratio between the number of spurs blossoming and the number fruiting; the more there are that blossom the lower the percentage of fruits set. The result is that older trees produce their crop on a minority of the spurs even when all the spurs blossom. If fewer spurs blossom a higher percentage set fruit, and an equal or better crop of fruit may result. In practice, an ideal would be to have from a third to two-third blossoming each season.

Although thinning has been frequently advanced as a remedy for the off-year, it has given results in but few cases. The reason lies apparently in the fact that commercial thinning is done too late to affect blossom bud formation. Either the blossom buds are already formed for the next season or it is too late to modify the conditions determining their differentiation. Blossom buds can be distinguished from leaf buds as early as late June or early July. Removal of the blossoms before the fruits normally set in experimental tests has given successive blossoming. Early frost injury to the blossoms may likewise cause repeated blossoming of the same spurs.

Little more will be said of bearing although fruit production is the result desired. At present, interest centers about conditions of blossom bud formation, including spur habits as well as growth conditions of both the spurs and longer growths or branches.

Blossom bud formation is related to nutritional conditions. This seems to apply equally well to individual spurs or to trees as a whole. The principal measure used to show the relation of growth conditions to fruiting has been that of spur length. The part measured was the "previous season's growth," that is, the growth that was made when

the leaf or blossom bud was formed, not the current season's growth.

From the standpoint of fruitfulness the spurs may be classified as non-blossoming, blossoming and not fruiting, or blossoming and fruiting. The vegetative or non-blossoming spurs may be again separated into two classes, short and long spurs. Thus there are four classes of spurs. In the case of Wealthy these have average lengths as follows:

Class 1. Vegetative (short spurs)— $\frac{1}{8}$ inch.

Class 2. Blossoming (not fruiting)— $\frac{3}{16}$ inch.

Class 3. Blossoming (fruiting spurs)— $\frac{1}{2}$ inch.

Class 4. Vegetative (long spurs)— $\frac{3}{4}$ inch or over.

These relations of spur length to fruitfulness vary with the tree, variety, and season, but the main point is that such a relation clearly exists between growth (as measured by length) and fruitfulness. The medium length spurs are fruitful while the shorter and longer spurs are either unfruitful or less fruitful than the former. The fact of economic importance is that the fruitfulness of the older bearing trees appears to vary with the relative percentages of spurs of the different classes which are present.

The length of the spurs is of course not the cause of blossom buds forming but is only a correlated condition. Other characters such as the number of leaves on a spur, or better the leaf area of each spur, would show similar relationships. In fact the leaf area would probably show the closest correlations because of its function as a manufacturer of the type of foods which are known to be necessary in relative abundance before blossom buds are formed. At any rate, we can begin to appreciate more clearly that fruitfulness is a definite condition resulting from what appear to be rather definite conditions of nutrition and also that it seems possible to arrive at fair judgments of these conditions from external growth relationships.

An off-year is seen to be definitely related to the growth when we make a study of their fruit spur habits. An apple blossom bud produces two kinds of growth; the blossoms and a secondary wood growth which generally forms a vegetative bud, Fig. 1, A. This secondary growth seems to function much as a separate spur and in growth measurements made, it has been considered as such. That is, when measuring the blossom spur growth, from the standpoint of bud formation, only the secondary growth, from the cluster base out, was considered. With biennially bearing Wealthy trees it was found that in the on-year over 90 per cent of the secondary growths were less than one-eighth of an inch long or over 90 per cent of the growths were of class one. This very logically results in an off-year. During the off-year when no

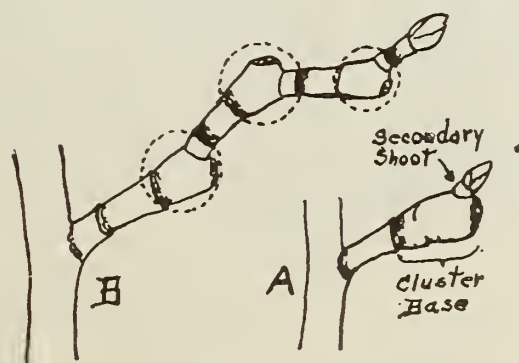


Figure 1. Fruit Spur Habits of Off-year Trees.

A. The growth during the blossoming season consists of a "cluster base" and a "secondary shoot." This latter does not regularly form a blossom bud.

B. In the off-year a vegetative growth is made which usually forms a blossom bud. This gives a biennial growth cycle of the individual spurs.

blossoms are produced, on the same trees, over 90 per cent of the growths were of classes two and three. In other words, these trees have a biennial growth cycle in which the spurs fluctuate from vegetative to fruitful. Fig. 1, B. The drain on the food reserve for the production of blossoms and the lack of a sufficient reserve seems to be the factor limiting the growth of the trees during the fruiting year.

Annually bearing trees of any given variety, like biennial ones, have growth conditions which would account for their regularity. In the first place they are generally very much more vegetative. Their average terminal growth is usually ten to fifteen inches in length as compared to four to six inches for off-year trees. Accompanying this greater terminal growth are some very important differences in blossom bud production, such as the occurrence of blossom buds on secondary growths and the formation of some terminal and lateral blossom buds. There are, however, two other main differences in the growth of biennially and annually bearing trees to account for their fruiting differences. (1) Many non-fruiting spurs during a fruiting year make enough growth to become class two or class three spurs (blossom forming) instead of remaining class one spurs (non-blossoming), as is the case with biennial trees. Thus some blossom buds are formed while the tree is fruiting. (2) What is probably the principal difference between the two types of trees is in the fruiting spurs on third year wood. Trees with short terminals develop few spurs on second year wood. Such as are produced are usually weak and do not form blossom buds unless spurs over the whole tree are forming them. With trees having terminal growths of a foot or more in length, on the other hand, there are several spurs on second year wood, some of these are usually of classes two and three and blossom buds are formed regardless of whether the older spurs are in or out of fruit.

Before discussing control factors it is well to restate that the spurs and growth lengths of which we have been speaking are not the cause of blossom bud formation. Internal compositions have been shown, as by Kraus and Kraybill,* to be related to external responses, one of which is fruitfulness. It is apparent, then, that any factor causing changes in the reserve foods of the plant could affect its fruiting. The value of any cultural practice in giving fruiting is an indirect one, acting through its having modified the internal composition of the trees. It is probable that less value should be placed upon any single treatment as fertilizing, cultivating or pruning, than has been the case formerly. Different treatments may have similar effects, thus pruning of a certain type could have the same effect upon fruitfulness as certain fertilizer applications, through a like effect upon the tree composition. There are, however, some rather definite ef-

fects from the different practices and it is in a few of these that we are especially interested.

Before deciding upon a cultural practice to remedy poor fruiting it should be recognized first that lack of fruit might come from either an over vegetative or an under vegetative condition and that it is in an intermediated one in which the greater fruitfulness occurs. After having classified the trees as to their condition, the character of remedy to be used can be foretold more accurately. The orchardist has rather definite signs by which to measure the vegetative state of the trees, as leaf sizes and color, length and diameter of spurs and branches, fruit sizes and colors and the occurrence and position of blossom buds.

Trees with long growths, dark green leaves and large, often poorly colored fruits generally have a high nitrogen or protein content and a low carbohydrate content. The latter substances are apparently used up in making new vegetative growth. The presence of nitrates seems to largely determine the vegetative condition of the trees. With an abundance of nitrates and moisture there is a large growth and a consequent lower carbohydrate content. This creates conditions which have been found to be unfavorable to blossom bud formation. Hence over vegetative trees are often unfruitful. Conversely, trees making little growth, having yellowish green leaves and producing small, unusually highly colored fruits generally have a low nitrogen content and a high carbohydrate content. The carbohydrates apparently accumulate because of little being used up in the production of growth. Such trees may be too low in vigor to produce blossom buds or, if they do develop them in abundance, they are too weak to produce much fruit. With this in mind and knowing that fruitfulness results from a condition of balance between the nitrogen and carbohydrate content we can proceed to a consideration of control measures with better chances of making suggestions of value than was possible formerly. In general, nitrogenous fertilizers such as nitrate or soda, proper cultivation and heavy pruning can be used to increase the vegetative growth of the trees. The opposite conditions, as sod culture and no pruning may reduce the growth to the point of poor fruiting.

Biennially bearing trees are typically low in vegetative growth. In their case the question is usually one of what means to employ to increase the growth. This leads to the question of the specific values of the different cultural practices in inducing a condition of greater vegetation. Unfortunately not much is known of these values at present. However, some generalizations based upon common experience and experimental results can be made with some assurance of keeping to fact.

Nitrogen is recognized as a most important fertilizer element in inducing an increased growth. Experimental trials show that the applications should be made early and in a readily available

form. Two factors have a bearing upon this result. One is the very low nitrogen content of most soils at the time of spur growth, even though they have a high available nitrogen content later in the season. The other is the very short period of spur elongation. In Wisconsin the shorter growths, which are typically the fruiting spurs, make their growth in length by the time the trees come to full blossom. Any success in increasing spur length and leaf area depends naturally then upon an application of fertilizer two or three weeks before the trees blossom. The result of the use of nitrogen fertilizers is to increase the growth, especially that of the terminals. From the off-year standpoint fertilizers could be used to maintain a terminal growth that would give blossom bud formation on the second year wood and fruiting in the third year.

Too little is known of the specific effects of cultivation in increasing tree vigor. It is a common experience that cultivation generally increases the growth. Whether this is due more to changes in moisture or in fertility conditions is not certain. At any rate the cultural treatment of any one season seems to have more effect upon the terminals than upon the spurs. This might be expected from the relation of cultivation to nitrate formation. Good cultivation greatly increases the amount of nitrates in the soil as compared to that in sod orchards. The important point is that the nitrogen content is not

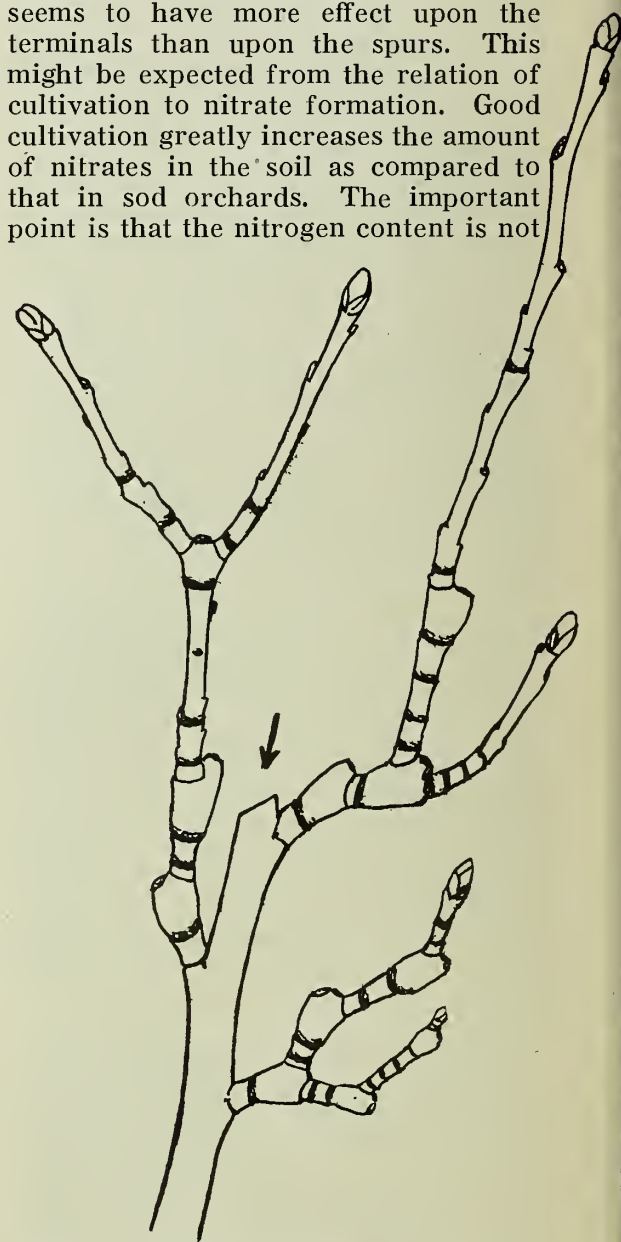


Figure 2. Effect of "Small Cut" Pruning Upon Spur Growth.

Older run out spurs can be made more vegetative by making pruning cuts close to spurs. Thin out top with many small cuts instead of by removing a fewer number of larger limbs.

*Oregon Experiment Station Bulletin 149.

Bean Power Sprayers

Bean Power Sprayers have a long and wonderful record of results—increasing orchard production, bringing neglected orchards into successful bearing, controlling pests, and helping growers to better profits. The Bean was the first successful spray pump ever offered to the fruit growing world. That was 36 years ago. Since then a multitude of sprayers have come and gone, but the Bean has maintained its lead from the start, and today is recognized as *standard equipment* everywhere.

To say that a sprayer is "as good as a Bean" in any particular feature is to say the best that can be said of any sprayer—only there is no sprayer as good as the Bean except the Bean itself!

"Bean" is more than the name of a sprayer—it's the name of a Service. Two large factories—one in Lansing, Michigan, the other in San Jose, California—serve both East and West. Out from each plant there travel a corps of trained sprayer experts whose business is to co-operate with the grower. And in every fruit-growing section is a resi-

dent Bean distributor. You are never more than a few hours away from a complete stock of Bean Parts and Accessories, a Bean representative and Bean Service.

Send the coupon. Get the new Bean catalog. It illustrates and describes the entire Bean line from the Bean Magic Hand Pump and the sturdy little Bean Baby Simplicity (a wonderful little one-man power rig) right up to the Bean Super-Giant, the largest and most powerful spraying machine that's made. Do the right thing first—get a Bean and you will get results.

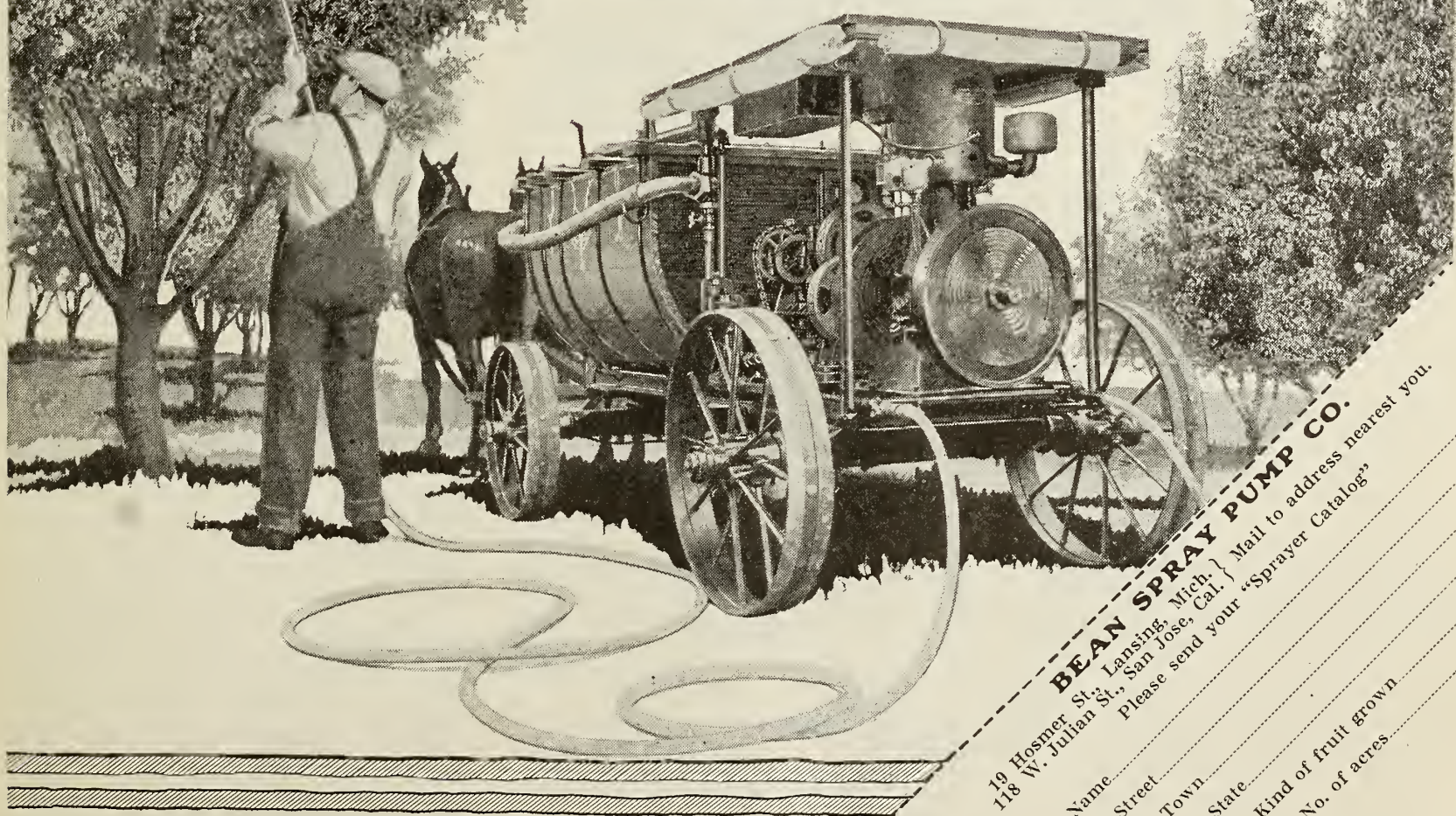


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Name.....
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State.....
Kind of fruit grown.....
No. of acres.....

high until late in the season after spur and spur leaf growth is over. As growth is in relation to the food reserve as well as to current seasons cultural conditions, any practice tending to change the nature of the reserve materials, could have an influence upon the growth responses. During a course of years, their cultivation could so alter the internal composition of the trees as to give marked differences in even the spur growth, when compared to that found in untilled orchards. Fruit trees need early season fertilization. Cultivation gives the greatest available nitrogen late in the season, after spur growth is mostly over.

Pruning has been found to play a most important part in inducing regular bearing of off-year trees. This is because of its value in rejuvenating the older spurs, Fig. 2. Irregular bear-

ing is common where there are many spurs of a low vegetation condition. Owing to the fact that the effects of pruning are largely local, small cuts near "run-out" spurs can be used to increase their vigor, give a variety of spur classes and tend to result in regular bearing. Also, cases of too much shade are subject to remedy by pruning. Pruning by the removal of large limbs should be avoided. Such cutting has a minimum influence upon the growth of older spurs along the remaining large branches. Thinning out of the tops should be secured by a larger number of smaller cuts being made close to the spurs which it is desired to rejuvenate.

Suggestions of how to secure annual bearing depend upon how near or how far the trees are from being regular now. This can be known only after ob-

serving the type of growth made by the trees, as to whether it is over, under or medium vegetative as compared to trees giving the best fruiting responses. "It is important when judging the trees, to know the amount of spurs blossoming but equally important facts to determine are: Are any blossom spurs forming on second-year terminal growths? How much growth are the non-blossoming spurs making? Are they making so little growth that no blossom buds are formed (while the tree is fruiting)? Are they making enough growth to be in the class of spurs that form blossom buds? The answer to these questions should be the basis upon which to build the cultural plans."*

*Wisconsin Experiment Station Bulletin 317.

The Northwest Fruit Growers' Conference

WITH over 200 fruitgrowers in attendance, the annual meeting of the Washington State Horticultural Association, the Northwest Fruitgrowers' Conference and the Washington State Grade and Pack Conference opened at Spokane Monday, December 13, concluding on the 16th. W. S. Gilbert, president of the Chamber of Commerce, welcomed the fruitgrowers to the city while F. A. Wiggins, vice-president of the association, responded. President H. G. Boehlke of Wenatchee in opening the sessions of the horticultural association spoke briefly. His remarks were chiefly devoted to the cooperative movement in general among farm and orchard producers and the necessity for organizations of this kind.

The part of the program devoted to the control of insect and other plant pests and horticulture in general was then taken up and occupied much of the time of the convention. A leading topic in this connection was the injurious work of the leaf roller which was said by Leroy Childs, entomologist at the Hood River experiment station, to be causing serious damage over an area including California, Oregon, Washington, Idaho and Montana. Mr. Childs who has had considerable experience in fighting this pest advised poisons and contact sprays such as arsenate of lead and black leaf forty to destroy the young worms after they have hatched, and oil sprays to destroy the eggs.

In discussing the spray residue left on apples at times which caused considerable loss to a few Northwestern fruitgrowers last year by having their apples condemned in the East E. J. Newcomer of the U. S. Bureau of Plant Industry said that eliminating this eastern prejudice was a matter of education. He said that eastern consumers must be taught that in order to have fancy fruit it must be sprayed and that the small amount of spray sometimes left on the fruit was harmless.

Dr. A. L. Melander, entomologist of the Washington State College, in his remarks on pest control stated that the

work along this line was seriously hampered by lack of funds to carry on the work and A. B. Kelly urged that horticulturists bring strong pressure to bear to get larger appropriations for this and similar work.

Taking up the matter of the extension of the strawberry root weevil pest throughout the Northwest M. L. Dean, state horticulturist, discussed the advisability of establishing a statewide quarantine. The state agricultural department, he said, had this matter under consideration at the present time.

In the matter of interstate quarantine regulations W. H. Wicks, director of the Idaho State Bureau of Plant Industry, said that it was the sentiment of quarantine officials to modify to some extent the regulations now in effect and that a meeting of the Western Plant Quarantine Board was to be held soon to discuss the proposed modifications.

How to keep mice from girdling trees, which was an interesting subject, was handled by Theo. H. Scheffer. J. H. Stahl, of the Western Washington Experiment Station had for his subject small fruit growing, while R. T. Reid of Seattle discussed the grape in Washington. Better ventilation and more attention to maintaining a proper temperature for apples in storage and transportation was urged by R. R. Pailthorpe of the United States Bureau of Markets, while D. F. Fisher, pathologist of the United States Bureau of Plant Diseases, presented the results of investigations of apple scald. The various diseases of apples and their cause was the topic handled by Dr. F. D. Heald, pathologist of Washington State College, who went into his subject thoroughly and gave the growers much valuable information. Professor O. M. Morris of the state college gave an interesting informal talk on the effects of temperatures on fruit trees. Soil fertility was explained by Roy Larsen of Wenatchee, followed by E. D. Newsom who told of the importance of soil analysis. Other subjects presented were "Alfalfa a Soil Builder," E. S. Robertson, Extension Division, State College; "How to Prune

for Efficiency," W. P. Sawyer, Wapato; "Fruit Transportation Problems, Water versus Railway," J. Curtis Robinson, Seattle; "The Northwest's Opportunity" (an address on the benefits of cooperative growers' associations), C. I. Lewis, organization manager Oregon Growers Cooperative Association; "Cooperative Organization," Stanley Arndt, San Francisco; "Cooperative Marketing," Joseph Passonneau, Pullman, director of the State Bureau of Markets.

At a special evening session devoted to the subject of spraying, "The Effects of Dormant Oil Sprays," was presented by C. C. Vincent, professor of horticulture of the University of Idaho, while B. G. Pratt of the "Scalecide" company, New York, A. J. Gunderson of Cleveland, representing the Sherwin-Williams Company, and C. J. DeVise of the Rex Spray Company of Yakima, Wash., talked on the value and use of their respective sprays.

The joint meeting of the beekeepers and fruitgrowers resulted in a valuable interchange of ideas. George W. York, the veteran bee expert of Spokane, told of the value of bees to horticulture; Dr. A. L. Melanders explained how bees pollinate blossoms, and J. J. Romage gave an enlightening talk on "Bees and Fruit as a Business."

Cooperative marketing was unanimously endorsed, the resolution saying in part "that it be resolved that the horticultural association of Washington recommends the earnest consideration and investigation of cooperative marketing to devise cooperative assembling and marketing associations suited to our conditions and products."

Stating that the fruit industry is bearing an inequitable burden in the matter of freight rates another resolution requests the appointment of a horticultural committee to work with the National Farm Bureau in taking up this question. The Truth in Fabric bill, the Capper-Volstead bill or a similar measure, the Vestal bill applying to standard containers, and the Kahn-Wadsworth or a similar bill authorizing the government to operate the nitrate plant at

Mussel Shoals were endorsed by a unanimous vote. An increase of 100 per cent in the appropriations of the Washington State Agricultural College experiment stations and extension service was also strongly recommended.

The officers elected for the coming year are: President, F. A. Wiggins, Toppenish; first vice-president, R. H. Kipp, Quincy; second vice-president, Dr. H. L. Geary, Underwood; secretary-treasurer, M. L. Dean; directors (three-year term), G. H. Boehlke, Cashmere; J. Howard Wright, Yakima.

Notwithstanding the strong plea of the Yakima delegation to the Grade and Pack Conference that the three grade pack be abandoned and the two grade pack substituted the decision of the conference was to retain the three grade pack.

The social features during the conference including the annual horticultural dinner and the Ad Club luncheon were characterized by the usual Spokane vim, diversion, and sociability.

The general opinion of the gathering was that the outlook for the fruit industry in the Northwest is more than promising and that given a little time will adjust itself.

Intensive Fruit Culture Abroad

Intensive fruit culture to an extent scarcely to be found in this country was noticed at Cambridge, England, by Prof. L. C. Corbett, of the United States Department of Agriculture, who has just returned from a European mission. A concern there has an orchard of 1,400 acres, so densely set that machine cultivation or the introduction of a horse-drawn spraying machine is impossible. Apple trees are set 2 rods apart and are headed high, 6 or 7 feet from the ground, the spread of limb being more than 6 feet from the trunk. Between the apple rows, plum trees are set midway and also headed high; beneath the plum and apple trees, currant and gooseberry bushes are set in rows 3 feet apart.

Before the war culture was by hand, even to the spading. When the war took away man-power the owners saved themselves by introducing small "wheelbarrow tractors," manufactured in the United States, which have a tread of only 18 to 20 inches. The density of the orchard, of course, precludes horse-spraying. To meet this condition a complete waterworks system has been run through the roadways, which are placed at intervals, and lime-sulphur mixture or Bordeaux mixture is pumped through the mains from a central power plant, spraying 200 acres. The mixture is taken off by hose connected at intervals. The company owning this orchard has a large preserving plant for the manufacture of jam when the market is poor for plums and apples.

In Lombardy and Normandy, on the contrary, apple culture appears to be incidental to pasturage. The trees are set 50 or 60 feet apart and are pruned high so as to be out of the way of stock. Apples of Northern France are largely used for cider, in the manufacture and blending of which the people are as expert as in the manufacture of wine.

TOP-DRESSING TALK No. 2

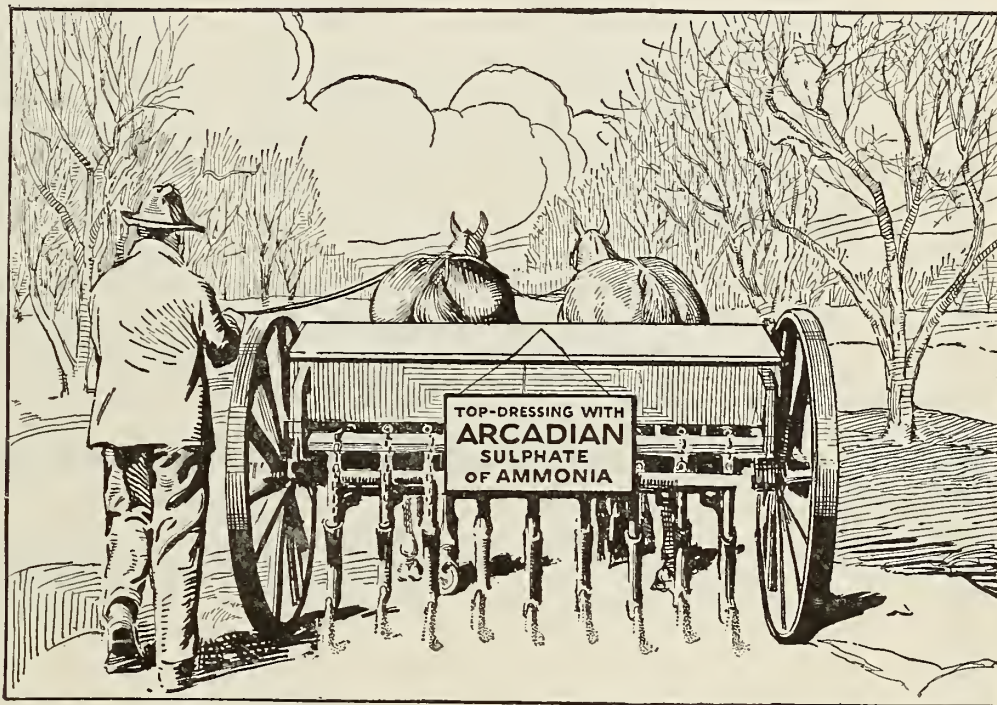
Off-Year Bearing of the Apple

"Observation of alternate bearing orchards for the past five seasons, however, leads to the suggestion that this habit is largely due to nutritional conditions.

"Off-year trees have been made to bear in succession by experimental means.

"The view has been presented that the use of an early season application of a quickly available nitrogenous fertilizer may be one means toward including regular bearing of off-year varieties of apples." (Wisconsin Bulletin No. 317—"Off-Year Apple Bearing.")

"Both the Yellow Newtown and the Spitzenburg seem to be alternate bearers, and even under some of our fertilizer experiments continue to be. On the other hand, in some of our experiments we were able to get three successive crops with both Spitzenburgs and Newtowns. It would appear reasonable to conclude that such a condition was due to the fact that all factors surrounding the tree contributed to such a condition, namely, that tillage, irrigation, pruning, etc., all contributed to this general result and harmonized with the fertilizer treatments." (Oregon Bulletin No. 166—"Fertilizers for Oregon Orchards.")



Arcadian Sulphate of Ammonia

Proper use of a nitrogenous fertilizer in the orchard demands a quickly available form of nitrogen, and this must be applied two or three weeks before blossoming. *Arcadian Sulphate of Ammonia* is, therefore, the ideal nitrogenous fertilizer for orchard work. It is quickly available and because of its non-leaching property

can be applied early without danger of loss from washing.

Arcadian is fine and dry, and can be applied by hand or machine. An excellent method of applying is with the grain drill set to feed slowly—100 to 300 lbs. per acre, depending on the needs of the trees.

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Orchard."

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Entering into 1921, this Company has effected arrangements which include provision for time payment and price reduction guarantees in the sale of its tractors. Prospective Titan owners will be glad to have the assurance of this benefit and safeguard during the present period of uncertainty. Details may be had by application to any International dealer or by letter from the address below.

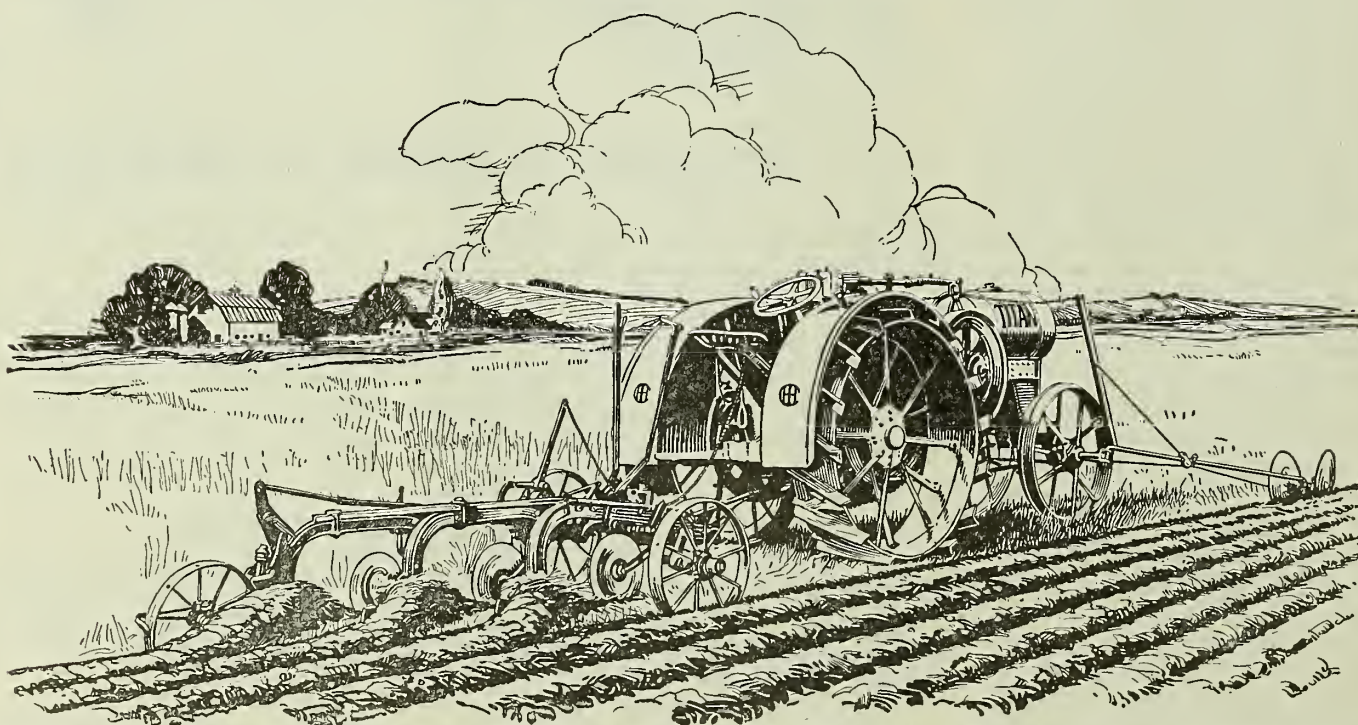
Farmers who believe in the money value of high standards in agriculture, as this Company believes in manufacturing standards based on quality, will be helping to build higher the achievement of Titan in 1921.

With every Titan 10-20 Tractor purchased from us—cash or liberal terms—between now and May 1, 1921, we will give our written guarantee that if this Company reduces its price on Titan 10-20 Tractors on or before May 1, 1921, we will refund the purchaser the amount of such reduction.

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Apple Scald—Its Cause and Prevention

Delivered before the International Apple Shippers' Convention by Charles Brooks

(Continued from December Number.)

ANOTHER condition that makes it difficult to solve the scald problem by means of storage ventilation is the fact that it does not suit to ventilate at the time the apples need it most; that is during the first weeks of storage. The outside air is likely to be warm at the time the plant is running at full capacity to bring down the temperature of the incoming fruit and the managing force fully occupied with other duties. Some storage plants that make a point of throwing their windows and doors open do not begin this ventilation till the last of December or first of January. This is too late to be of any benefit to the early scalding varieties as the time for the remedy is passed several weeks before the scald actually appears. Grimes apples do not usually become scalded until after they have been in storage 12 to 14 weeks. A single really thorough changing of the air around the apples themselves at the end of 6 or 7 weeks will delay the time of scald appearance more than a month but an equally good ventilation at the end of 8 or 9 weeks will have little or no effect upon the time that scald will appear. The abnormal conditions have then prevailed too long; the stage is already set for the scald that will become evident several weeks later and remedies are of no avail.

Some apple communities have adopted a method of delayed packing that is of considerable value in scald prevention. The apples are stored in open picking crates just as they come from the tree and are later transferred to a special packing room, run over a grader furnished by the storage organization and packed in boxes and barrels ready for the market. The open crates secure quicker cooling and better aeration while in the storage room and the thorough airing given in sorting and packing sends the fruit back into storage sufficiently freed from harmful gases to add several weeks to the storage life of the scald susceptible varieties.

One of the things that plays a very important part in determining the effects of any storage ventilation is the manner in which the barrels or boxes are stacked in the room. Some storage houses stack their boxes solid but most of them use strips between the layers and leave space between the stacks. A large number of storage houses leave an open space around the walls and some of them, particularly those in the West, hold the fruit 2, 4 or even 6 inches from the floor by means of scantling or some form of false floor. All of these things that tend to give openness to the stack are valuable for both refrigeration and ventilation and all are of value in scald control. We have not found, nor been able to develop any commercial storage condition that will completely handle the scald problem. The apples in the middle of the stacks do not get the fresh air and are but little benefitted by storage ventilation. In a test made

in a storage room that was opened frequently it was found that the apples in the center of the stack became scalded four weeks earlier and finally developed about three times as much scald as those near the doors.

Air-cooled storage houses often secure as good or better results in scald prevention as the commercial plants, the bad effects of the higher temperatures being offset so far as scald is concerned by the good effects of the ventilation. An air-cooled plant that maintains a fall temperature of 40° to 45° may be able to bring its apples through fairly free from scald; but if a commercial storage plant with its tightly closed rooms should be compelled to allow its temperature to remain at such a high point for a few weeks in the fall because of a shortage of refrigeration or a poor distribution of the warm fruit the condition would result in a great increase in scald later in the storage season.

One of the most important places for ventilation is the packing house. Fortunately most packing houses are really sheds and cannot be closed. The free circulation of the night air is particularly important both on account of its coolness and the ventilation secured. Large closely stacked piles of fruit in the packing shed may produce distinctly harmful effects, especially if the top and front of the pile is continually passed along to storage and the bottom left undisturbed for a number of days.

The character of the packing plays a very important part in ventilation and is therefore a determining factor in scald occurrence. Apples scald far less in boxes, hampers and ventilated barrels than they do in the usual commercial barrels. This is especially true where the storage room receives at

least a small amount of ventilation. We have had particularly good success with the ventilated barrels. In most of our storage experiments these were prepared by cutting 15 holes or slits (each $\frac{3}{4}$ inch by 4 inches) in the staves of the ordinary apple barrel. Reducing the total area of the holes by one-half gave much poorer results. Apples packed in the above ventilated barrels have usually had the scald reduced to one-half or one-third the amount on similar apples in the usual commercial barrels and the disease has appeared on the fruit three to four weeks later. The ventilated barrel shows up to the best advantage in cases of delayed storage. Apples in ventilated barrels delayed a week to ten days in an open packing house will usually show less scald than those in tight barrels that are stored immediately. If the apples are fairly green at picking time a few days delay in ventilated barrels may actually improve the keeping quality of the fruit at least so far as scald is concerned.

While we were trying to find out what uses could be made of ventilation in scald prevention we were also making experiments to determine what the harmful substances were that needed to be removed from the apple for if we could only find this out we might be able to absorb them in the package or in the storage room and obviate the necessity of renewing the air. Conversations with cold storage men revealed the fact that many of them were of the opinion that high humidity in the storage room was favorable to scald. Experiments were therefore made to test this theory, apples being stored in atmosphere having various percentages of moisture. With 50 per cent relative humidity the apples withered badly yet they scalded if the air was not stirred. With 70 per cent relative humidity some varieties withered and all scalded if the air was stagnant. The scald was

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little worse with 80, 90 and 95 per cent relative humidity than with 50 per cent. On the other hand if the air was kept in gentle motion scald did not occur even with the highest humidities. Some indication was found that moistures deposited in drops on the apple might favor the development of a sort of spotted scald but on the whole the experiments showed that humidity played little if any part in the production of scald as it occurs in commercial storage.

Defeated in our purpose of proving the humidity guilty, we felt sure that the trouble must be due to abnormal respiration conditions, either that the oxygen of the air boxes became too greatly reduced or the carbon dioxide accumulated to a harmful extent. Experiments were made in holding apples in atmosphere having various percentages of oxygen, the normal amount, an excess and a deficiency, but they scalded alike under all the conditions. Tests were made with carbon dioxide, the apples being stored in atmospheres having various percentages of the gas, some of them much higher than ever occur in commercial storage; but we found that carbon dioxide really tended to delay rather than hasten the development of scald. We were especially disappointed with the outcome of the tests on carbon dioxide for we knew that the gas sometimes becomes quite strong in storage rooms and we felt sure it would be found an important factor in scald production.

We did, however, obtain one important result in connection with the experiments on carbon dioxide and moisture. While the results showed that these substances were not responsible for the occurrence of scald they proved that they were the cause of what is known as soft scald. Soft scald occurs largely on Jonathan and Rome Beauty apples and occasionally on Spitzenberg and Stayman Winesap. It produces blister like areas on the skin that extend over the surface, in various peculiar patterns. The red surfaces are attacked as much as the green ones and there is a clear cut margin between the sound and diseased tissue. It bears some resemblance to frost injury and damages have sometimes been paid on it under that name. The cause of the disease, however, is not too low a temperature but an excessive accumulation of carbon dioxide and moisture usually at a high temperature and especially in cases of delayed storage. In all the cases of soft scald of which we have been able to obtain the records, the fruit had been delayed at a fairly high temperature before going into storage.

To return to the apple scald question we found ourselves near the end of the third year of our storage experiments with little but negative evidence as to the substance that was really causing the scald. We had made no experiments on the odor producing and related substances given off by the apple. We didn't know what they were nor what would absorb them and really didn't think they could be of importance. But following up the gas mask

idea we stored apples in various kinds of charcoal and sawdust and in almost everything we could think of that had some gas absorbing power. We knew that butter absorbed odors and that fats and oils were used in extracting perfumery so we made a thorough test with wrappers impregnated with various waxes, fats and oils. Most of the things tested were a failure, the wax and paraffin wrappers were of little value but those with either a fat or an oil were a complete success. We have used the oiled wrappers now for three years, have tried them on practically every scald susceptible variety and tested them under the most severe and unfavorable storage conditions and with the exception of one test they have always given 100 per cent control of scald. The exception was with a very green lot of Black Twigs and in this case the disease was delayed about a month and was reduced from 65 per cent on the unwrapped to 15 per cent on the oil-wrapped fruit. We have tested almost all kinds of vegetable, animal and mineral oils and while most of them will control the scald the highly refined paraffin oils seem to be the most satisfactory. They are among the cheapest oils, they do not become rancid, and they are already extensively used on paper and otherwise in connection with food products.

The oiled wrapper is by far the most efficient remedy we have found for scald. It also has an advantage over other devices for scald prevention in the fact that it is always with the fruit furnishing protection on the way to storage, while in storage and in after storage shipments.

One difficulty with the oiled wrapper is that it is not adapted for use with barreled apples and these need protection from scald more than any others. We have tried to find some other means

than the wrapper of carrying the oil with the apple. We have experimented with oiled barrels and with scraps and strips of oiled blotter scattered through the barrel, but the oil does not come in close enough contact with the bulk of the fruit to give anything like complete scald control. We have tried spraying the oil on the fruit as it goes over the packing table. This prevented scald but produced a scald-like injury where the oil remained in drops on the skin. Wiping the apples with an oiled rag has so far given complete scald control without injury but we have tried this only one season and on but a few varieties of apples. The method will be given a very thorough test the coming year. If it should prove an entire success there are already fruit wiping grader attachments on the market that could probably be utilized for applying the oil mechanically.

It may take several years of general commercial use to determine the most satisfactory manner of handling the scald problem but the disease is a preventable one and we have several methods of attack. Whatever is done, whether in the way of oiled apples, oiled wrappers, ventilated barrels, or ventilated cars, packing houses and storage rooms would have the same object; that of removing from the apples the harmful gases of their own production.

There will be more demand for trees, shrubs and vines than can be supplied by reliable nurserymen. Those who are intending to put out ornamental, shade or fruit trees, shrubs or vines should get in communication with growers of known reliability and place their orders early.

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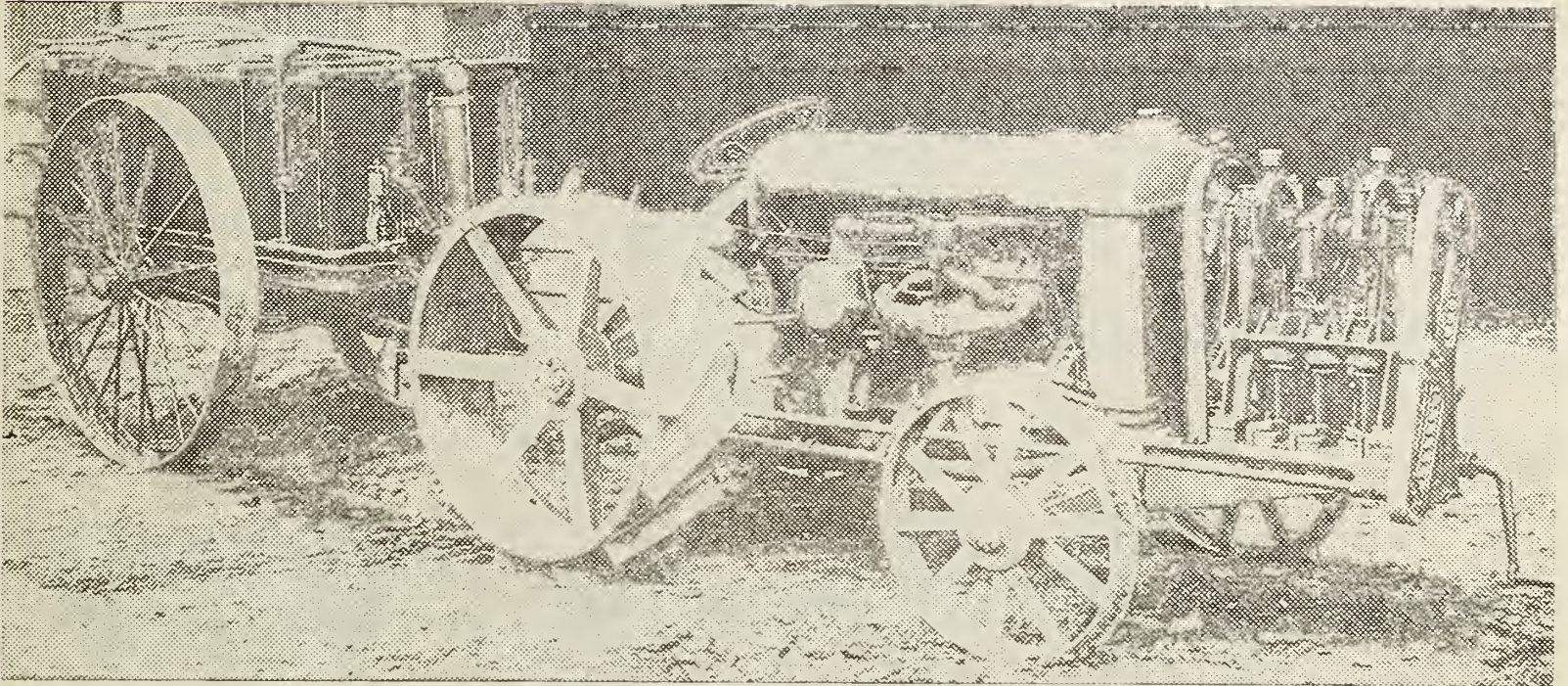
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Results of Studies in Prune Pollination

WITH a view to determining the failure of prunes to set fruit in some years while bearing abundantly in others the Division of Pomology of the University of California has been carrying on experiments for several years. Among the varieties being studied are the French which is grown quite extensively in the Northwest as well as California where the acreage of this variety is very large. In fact in the Santa Clara Valley alone it is stated that there are over 61,000 acres planted to prunes largely of the French variety with a few scattered plantings of Imperial and Sugar.

While the study made was largely confined to pollination, A. H. Hendrickson, who has issued a bulletin on the subject, says that the lack of fruitfulness generally did not point altogether to lack of proper pollination. In noting the results of his experiments Mr. Hendrickson says:

"While the Imperial, Robe de Sergeant and Silver prunes have long been considered shy bearers, the French and Sugar have continued to bear more or less satisfactorily when set out in large blocks of a single variety. Many growers in the Santa Clara Valley have noticed an appreciable falling off in their crops, and have been anxious for information relative to the cause. Improper pollination, due to self-sterility, was believed to be at least one important factor causing this imperfect set. Another factor has already been shown to be responsible to a degree for this failure to set commercial crops. This factor is the lack of honey bees in the orchards at blooming time. Proper pollination has been shown to be dependent upon insect agencies to carry the pollen. It is probable that other factors such as

pruning, cultivation, fertilization and irrigation will be shown to influence the amount of fruit set."

As a result of the experiments Mr. Hendrickson notes: "The three varieties of prunes, French, Sugar and Robe de Sergeant experimented upon at the university farm have set comparatively high percentages of fruit and matured fairly satisfactory crops considering the age of the trees. The French and Robe de Sergeant yielded consistently each year, but the Sugars failed to blossom in 1916. As this failure followed a heavy crop it was thought that the drain upon the tree had been so great that it was unable to mature fruit buds for the following season. This variety again in 1918 behaved in the same manner, failing to produce any blossoms. This seeming tendency towards alternate bearing is an uncommon occurrence with this variety. The general reports concerning it are that it bears heavily and regularly. However, from four years' data at the university farm at Davis, it would seem that if young trees just coming into profitable bearing are allowed to overbear one year, only a light crop is produced the following season. One of the most serious criticisms of the Sugar prune is that it tends to overbear.

"The French and Robe de Sergeant at Davis, on the basis of regularity in bearing, have proved to be more valuable than the Sugar. The former variety during the three years of 1915, 1916 and 1917 produced an average crop of 57.5, 41.7, and 145 pounds, respectively, or an average of 81.4 pounds per year for the three years. This crop resulted from an average set of 28.7 per cent. The Robe de Sergeant practically equalled the record of the French. In

three years the average crop per tree was 95.1, 79.6, and 100.6 pounds, or a total average per tree of 91.4 pounds from an average set of 28.7 per cent. Roughly speaking, the above yields approximate three tons of green fruit per acre, which is a fairly satisfactory commercial yield considering the age of the trees (eight years in 1915). In the case of the Sugar prune the average yield is only available for two years, as no crop at all was produced in 1916. These yields were 30.1 and 147.3 pounds per tree, or an average of 88.7 pounds per tree for the two years, resulting from the high average percentage of set of 41.6 per cent. If this yield is calculated on the basis of three years, as might properly be done, the average yield for the variety is thus reduced to but 59.1 pounds per tree.

"Two varieties of these prunes, the French and Sugar, are self-fertile, while the third, Robe de Sergeant, is self-sterile. Four years' results with self-pollinating the French prunes have shown great fluctuation in the percentage of fruit obtained. Some years this percentage was high and in others it was low, but the average for four years shows that this variety must be accepted as self-fertile. Upon what factors this self-fertility depends is not known but it seems to be largely a matter of applying the pollen at exactly the right time. Climatic conditions following the application of pollen may also exert some influence on the resultant set. This conclusion as to the self-fertility of the French prune, which is emphasized by the Santa Clara experiments, is of utmost importance to the prune growers of California. It shows why vast acreages of this variety have been able to produce crops year after year without the necessity of growing fillers as pollenizers. The next problem is to find what environmental conditions

favor the highest percentage of set when the blossoms are pollinated with their own pollen, as must necessarily be the case in most of our prune-growing sections.

"The Sugar prune which is supposedly a seedling of the French showed an average set of 8.1 per cent from self-pollinated flowers. This evidence was corroborated by data obtained in the Santa Clara Valley (four-year average, 8.4 per cent) and shows there is no need of interplanting other varieties with the Sugar for purposes of cross-pollination. The Robe de Sergeant has emphatically and consistently proved to be self-sterile and in urgent need of cross-pollination to secure crops. These data support the widespread contention among growers that unless it is properly interplanted with other varieties, the Robe de Sergeant is a shy bearer.

"In spite of their reputed relationship no trouble was experienced during the four years in obtaining satisfactory sets when French was crossed with Sugar or vice versa. The French prune was found to be readily cross-pollinated by either the Sugar or Robe de Sergeant. Although the average result of these

hand-made crosses was not as high as the set under open orchard conditions, they were higher than the average set resulting from the self-pollinations. Thus it was shown that, even though self-fertile, the French prune might still be benefited by pollen other than its own. The French prune has the additional good quality of being a heavy pollen producer and an excellent pollenizer for the other varieties of prunes. The French as a pollenizer for the Robe de Sergeant gave an average of 10.5 per cent set for the five-year period. The one year's results as a pollenizer for the Sugar cannot be considered infallible as results in the Santa Clara Valley have proved the French an efficient pollenizer for the Sugar.

"No eminently noticeable results were obtained at Davis when Sugar was used as the female parent. As a pollenizer for both the French and Robe de Sergeant, the Sugar has no equal. It produces an abundance of pollen, blossoms at practically the same time, and has proved effective in four years' trials. The high percentage (10.6 per cent) when used on French, and the still higher percentage (13.2 per cent) when

used on Robe de Sergeant, amply attest its value.

"While Robe de Sergeant was proved to be self-sterile, it was also shown to be readily capable of fertilization by any other European plum blossoming at the same time. French and Sugar as pollenizers for four years gave the best average results, but Tragedy, Pond, and Imperial Gage, tried for a lesser number of seasons also show possibilities as pollenizers for this variety. It is perhaps important to note that the prunes commonly grown with the Robe de Sergeant are so efficient as pollenizers that the other varieties mentioned (Tragedy, Pond, and Imperial Gage), are rarely found planted with it. As a pollenizer it has proved effective on the French, but because of an improperly timed operation in the one year it was tried, it was not so successful on the Sugar. In view of the foregoing it would certainly seem advisable to interplant Robe de Sergeant prunes with either the French or Sugar varieties.

"The most interesting fact noticed in studying the set of the fruit under open orchard conditions in two Santa Clara Valley orchards was the small percentage of blossoms which matured fruit. Yet it is with these low percentages of set that the commercial crop of prunes of California is produced. In the Pettit orchard at Cupertino this set has been remarkably uniform and has yielded each year what the owner considers to be a fair crop. In the Sorosis orchard at Saratoga the set was fairly uniform for 1915 and 1916, but in 1917 the owner placed some 115 colonies of bees in the orchard during the blossoming season. Because of the bees the percentage of set increased greatly in 1917 and raised the average for the three-year period up to 8.3 per cent. Moreover, the yield emphasises the effective work of the bees. In 1916 with the normal set averaging 3.2 per cent the yield on 180 acres was 344 tons of dried prunes. On the same acreage in 1917 with an average set of approximately 12.9 per cent the yield was 432, or an increase of nearly 100 tons of dried fruit."



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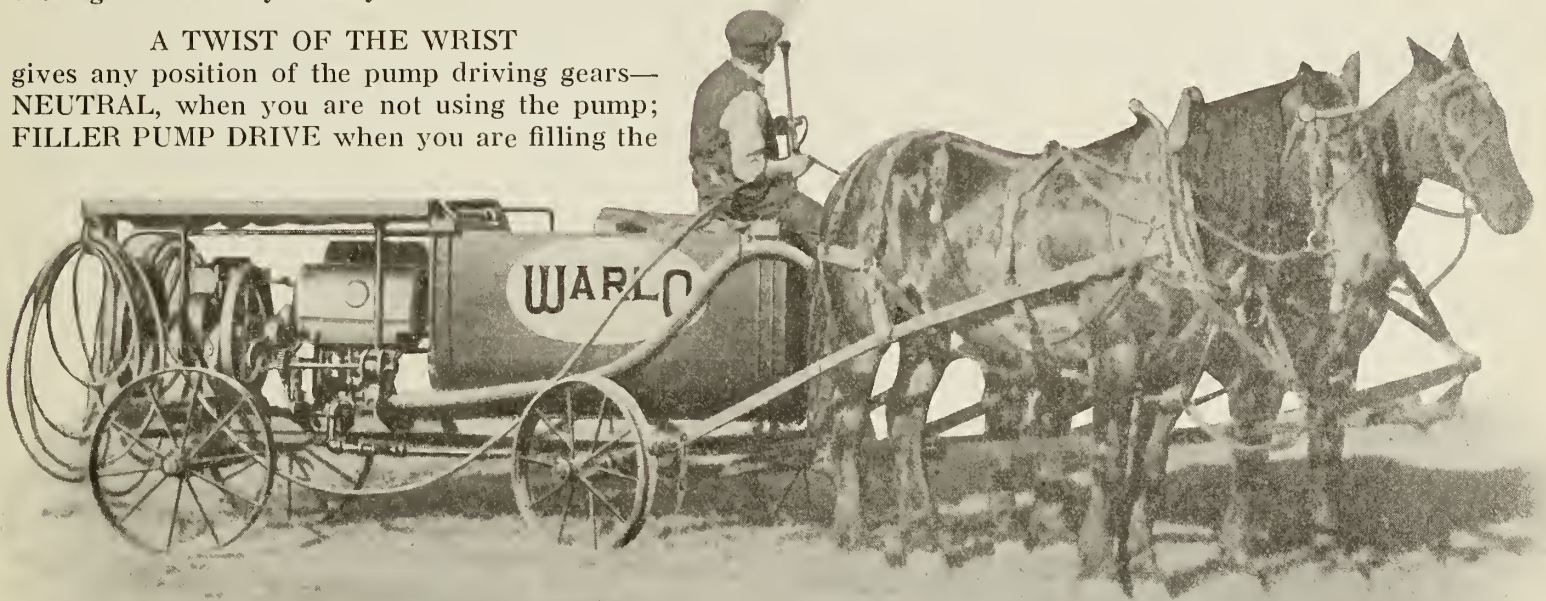
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Water Transportation.

The recent shipment of apples from Portland, Oregon, to New York at the hands of the United American Lines, a strongly organized steamship company recently formed for intercoastal service, is likely to be the opening wedge of a waterway movement of a large tonnage of fruit from the Pacific Northwest to Atlantic Coast points and Europe.

The importance of this move and the putting on of fast steamers that will sail from San Francisco and other Pacific Coast ports equipped with refrigeration that will make a specialty of carrying fruits from this region to the Orient are fraught with great possibilities to the fruitgrowers of the Pacific Northwest.

In writing of the great importance of developing water transportation for Pacific Coast fruits, Charles A. Malboeuf, who has had a wide experience in handling apples both in this country and abroad, says:

"Years like 1912, 1914 and 1920, similar as they are in many respects, point to certain definite conclusions. Foremost is the recognized vital need for a vastly greater market than now offered within our shores and those of the few export countries we are shipping to today, or have shipped to in the past. Call that specific need water transportation, and you express precisely what I have in mind, because in water transportation is embraced a host of potential benefits.

"In seasons of this kind, where the national apple crops are fairly or abnormally large, and subnormal economic conditions of varying acuteness prevail, the marketing of our apples becomes a serious problem. The crops, in whatever volume they may be, seem in excess of the market requirements, or at least beyond our ability to distribute at profitable prices. The general conclusion, under those circumstances, is that we must have more markets, specifically a greater export market. That expresses the situation broadly, but few persons realize the extent to which that export market must exist, especially the tremendous character of water transportation essential to properly meet actual needs."

Recent investigations are to the effect that large quantities of deciduous fruits can be disposed of in the markets of the Orient as well as Europe. All that is lacking for the Oriental trade apparently is transportation and this according

to recent announcements will be provided. The outlook therefore for additional markets through water transportation to markets both far and near seems bright enough to warrant the Pacific Coast fruitgrower in regarding it as one of his greatest possible assets.

Poultry in the Orchard.

Every fruitgrower should find it profitable to keep poultry, the number depending largely on the size of his ranch. Where the acreage is large and a diversity of crops are grown it is possible to maintain a larger flock than on a smaller place. It is found that where chickens are kept in connection with an orchard and are allowed to range that it is not necessary to buy much feed for them except during the few winter months. In fact the orchard provides a variety of foods such as insects, seeds, green matter and grit highly relished by chickens. The practice by most orchardists of planting a cover crop in the late summer or early fall and turning it under in the spring affords fine pasturage for poultry during the time

IMPORTANT NOTICE TO SUBSCRIBERS

Effective January 1st, 1921, the subscription price of "Better Fruit" will be \$1.00 a year, and subscribers who have renewed recently at the old rate of \$2.00 a year will be extended in accordance with postal regulations.

they are not confined. The eggs and fowls that can be taken to market from time to time add considerably to the family income in the way of living or in purchasing little things needed for the home.

In raising fowls it will pay the fruitgrower best to choose one breed, preferably of an all purpose strain, that is the kind of strain that are both good layers and good table fowls, as his marketing opportunities are doubled. Also if he is raising a pure-bred flock of chickens he will find it much more profitable in disposing of the chicks should he raise a surplus or go into the breeding business. With a well built poultry house and not too large a flock the orchardist who gives his poultry the right attention will find the venture profitable.

For these reasons BETTER FRUIT is opening a poultry department that it hopes will prove both valuable and interesting to its many readers.

A Tariff for Fruits.

From recent disclosures made by W. H. Paulhamus, head of the Puyallup & Sumner Fruitgrowers' Canning Company, in regard to foreign competition with some of our small fruits, notably cherries, and also through investigations along this line from other sources it is apparent that a tariff would prove beneficial in protecting American fruits and nuts from the competition of those grown under cheap labor con-

ditions and exported to this country and sold at a lower figure than the home-grown product.

The matter of a tariff to protect home-grown fruits has already been taken up tentatively by a number of fruitgrowers' organizations on the Pacific Coast and Congress will no doubt soon be asked to frame a law for this purpose. As the development of several branches of the fruit industry and its future prosperity will largely hinge on controlling or at least fixing the price for these foreign fruit products that will place them on a level with the home-grown article it is of great importance that such a measure receive the support of fruitgrowers and Congress as well.

Caring for a Patriarch.

The action taken by the Washington State Horticultural Association at its recent meeting in Spokane to provide care and protection for historical apple trees is of interest to every fruitgrower in the Northwest and is to be commended. The particular tree which the members of the Washington society had in mind when it adopted the resolution providing for this action is one that was planted at Vancouver, Wash., in 1826, according to historical tradition. The report of the committee which was assigned to care for the tree is that it is apparently healthy and in good condition although lacking but five years of being 100 years old.

Arrangements have been made to have this patriarch of appledom lack for nothing during its declining years, a fitting tribute to its historical interest as the oldest living representative of an industry that has now become one of the most prominent and successful in the state of Washington and other sections of the Northwest.

What the Papers Interested in Fruit Are Saying

THE PLOWMAN.

The plowman used to plod his way.
The old style plowman is today
Not such a factor.
For we have been progressing some;
The modern plowman rattles home
Upon a tractor.—*Tractor Farming.*

It cost the state hospital at Oshkosh \$128.40 to spray their 800-tree orchard under the direction of F. R. Gifford of the horticultural department at the Wisconsin College of Agriculture. When they figured their returns at the close of the apple harvest they found a return of 4,066 per cent on their spraying investment. Here is their story: Four sprays were applied at the right time. It took 800 gallons of spray mixture and the work of 3 men, and a team for 12 hours to apply each spray. It cost slightly more than 16 cents to spray a tree four times, their cost figures show. When they picked their apples they found that on an average sprayed tree they had eight bushels of apples worth \$1.25 a bushel, or \$10. But one-half bushel were unmarketable. On an unsprayed tree they got one-half bushel of marketable apples, and 4½ bushels of unmarketable fruit. They figured these apples as worth \$2.50. A spraying cost of slightly over 16 cents a tree made a difference of \$7.50 on the value of apples.—*Wisconsin University Bulletin.*

With apple prices gradually slumping, even best grades, winter varieties, a good deal of interest centers around the investigations just completed under the direction of the New York State Federation of County Farm Bureau Associations on cost of producing a barrel of apples under average conditions in Western New York

orchards. It is patent that the day has gone by when \$2.50 a barrel yields a handsome revenue to the grower, just as the day of 25c apple barrels has past. The local county farm bureaus assisted in collecting the data from among the best growers of the territory. Incidental to the work of collecting the data, a poll was taken of 260 growers in the district on what price should be received for Baldwins, "A" grade, to show the grower a fair profit on work and investment. Ninety-seven per cent of the estimates are \$5 a barrel or over with the average \$6.62.—*The Packer*.

The drift of population from the farms to the cities has recently been progressing more rapidly in Ohio than it has in this state, according to a survey just completed by W. F. Collander of the U. S. Bureau of Crop Estimates and the Ohio Bureau of Agricultural Statistics. This survey, which is based on records of from 100 to 300 farms in each

county, shows that in June this year there were 70,000 men and boys over 15 years of age who were working for wages on the farms of Ohio. The previous year 100,000 men and boys were so employed. This is a decrease of 30,000 men, or 30 per cent, a most surprising change for one year. New York State farmers were much disturbed by the shortage of farm labor last spring, but the decrease here was only about 15 per cent.

The Ohio figures also show that, exclusive of hired men, there were 340,000 men and boys on the farms in June, and 370,000 at the same time last year. This is a decrease of 30,000, or 8 per cent. During the same period the number of vacant habitable houses on farms increased from 18,000 to 29,000, an increase of 61 per cent.

These figures are worth careful study, for they show how quickly men flock to the cities when industrial wages are high.—*New York State Fruitgrower*.

Pointers on Ordering a Tractor

(From Tractor Farming)

IN VIEW of present business conditions it is only natural that many farmers who contemplate buying a tractor for 1921 should put off ordering until they have an opportunity to see whether prices will be lower next spring. At first glance this would seem to be the most sensible course to follow. Taken altogether, however, it is best to order a tractor now, especially if a guarantee is obtained that if the price is reduced next spring, the amount of reduction will be refunded.

There are several reasons why it will be better to have the tractor delivered this winter than to wait until time for the spring work to begin.

Most any tractor owner will say that he failed to get the best possible results from his tractor during the first few weeks' use, because whoever operated it was not thoroughly familiar with the proper care and operation of the outfit. It is, therefore, desirable that the tractor operator should have an opportunity to familiarize himself with the operation of the machine before the spring rush begins. By having the tractor delivered now or some time during the winter, it can be used for many odd jobs of belt and drawbar work about the farm or for neighbors. Many of these jobs will be easier on the tractor than will the heavy work of plowing and hence they make an ideal way to "break in" the tractor.

Most men know better than to take a brand new automobile and drive it full speed for long distances or pull it through long stretches of sand or heavy mud until after it has been "limbered up." Long experience has shown that it pays to drive an automobile slowly and carefully for the first few hundred miles while all bearing parts are wearing in and acquiring their polish. This practice is even more desirable for the tractor. Plowing is about the hardest work most tractors are called upon to do, and the new machine should not be put at this work until after it has been run for a number of hours at lighter jobs.

Cylinder walls, piston rings and other bearing surfaces, no matter how carefully machined or how fine the "cut" made in machining, are at first slightly rough. If these surfaces are well lubricated and the engine is run for some time under a light load, they will take a

high polish with very little wear, and after this polishing or smoothing up is accomplished, the wear will be very slight provided the lubrication is properly looked after.

The advantages of early delivery, however, are not all confined to the tractor itself. It is highly desirable, as already pointed out, that the operator should be familiar with the care and operation of the machine before the rush season begins. Just as many automobile drivers suffer delays and inconvenience because something does not work just right about their car and they are not familiar enough with it to locate and remedy the trouble, so some tractor owners are delayed on account of minor misadjustments which would be located and remedied in a moment's time by an experienced operator. Even if a man is familiar with automobiles and other gas engines, it will nearly always require some time for him to master fully the proper care and operation of a particular tractor so as to be able to obtain the best possible results.

Taken all together, the man who orders a tractor now has a great deal to gain and nothing to lose, provided he is guaranteed against a reduction in the price of a machine before spring. As everyone knows, transportation is not as swift and certain as could be desired, and delays in delivery are always a possibility when the order is not placed until the working season is about to begin and hundreds of farmers are buying tractors. It will be easier to get delivery if an order is placed at once, and if any parts are missing or anything is wrong about the machine which has been overlooked in the inspection and test at the factory, there will be plenty of time to have these things looked after before the tractor is urgently needed. Ordering a tractor is one of the many things which should not be put off when it can be best done today.

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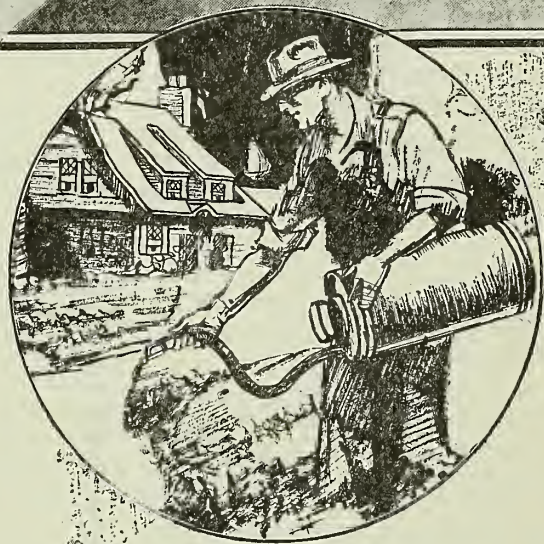
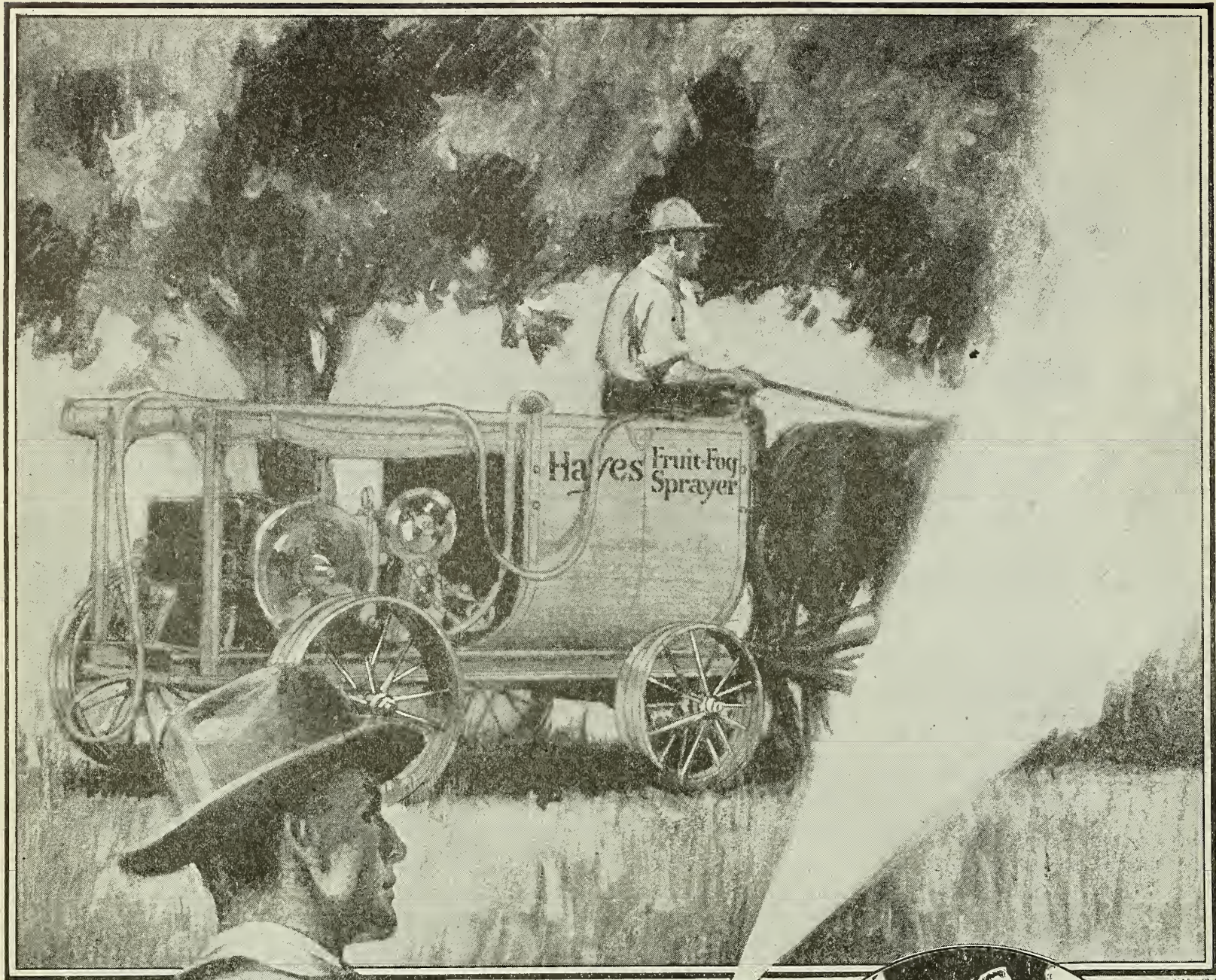
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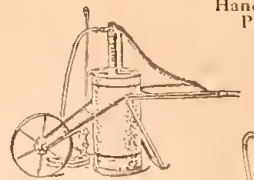
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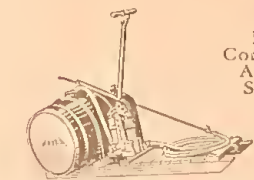
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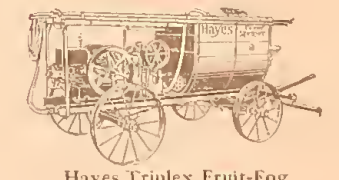
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WHEN WRITING ADVERTISERS MENTION BETTER FRUIT

Oregon Horticulturists in Annual Meeting

FROM all parts of Oregon fruitgrowers met during the early part of last month to attend the 33d annual convention of the Oregon State Horticultural Society. A number of valuable papers were read before the convention, while features outside of the regular business transacted were a visit to the plant of the Eugene Fruitgrowers' Association and a banquet on the concluding day of the session.

The meeting was presided over by J. O. Holt, president of the State Horticultural Society. In referring to the outlook for the fruit industry in the state at the present time President Holt said that fruit growing as a whole has been profitable during the last two or three years and that this season prices opened up at a very high level. Like those of other commodities, however, prices have been obliged to come down and this downward movement has gained such headway that there seems to be nothing to do but hold unsold fruit until such time as there is a more satisfactory market.

A resolution of importance that was

adopted was to the effect that the legislative committee be instructed to formulate grading and packing rules covering all fruit products after a conference with representative commercial growers of the state. It is planned to have the proposed law conform as closely as possible to the measure now in force in the state of Washington.

Some of those who addressed the convention were John McGee of Orenco who spoke on two new varieties of prunes that are attracting considerable attention, Joseph Nibbler of Woodburn, W. G. Allen of Medford, J. B. Pilkington of Portland, A. A. Quarnberg of Vancouver, Wash., C. I. Lewis and R. C. Paulus of Salem, of the Oregon Growers' Cooperative Association, C. A. Parks and Henry E. Dosch of the Oregon State Board of Horticulture. Interesting features of the program also was the recital of the history of the society given by Homer C. Atwell, former president of the society, and addresses given by H. P. Barss, plant pathologist, and W. S. Brown, chief in horticulture at the Oregon Agricultural College.

Forest Grove was chosen as the next place of meeting and the following were elected as the officers of the society for the coming year: Earl Pearcy of Forest Grove, president; A. C. Brownell of Portland, vice-president; C. A. Minton of Portland, secretary and treasurer, and Henry E. Dosch of Hillsdale, trustee. The legislative committee consists of R. C. Paulus, Salem; C. A. Parks, Salem; Albert H. Marsh, Roseburg; Ira Hutchins, Corvallis; L. T. Reynolds, Salem.

Market for American Fruit in China

China has within her boundaries one-quarter of the total population of the world and the mass of her people are fruit lovers. A certain amount of American fruit, both fresh and dried, has already found its way into the Chinese fruit stores, but the opportunities for expansion are immense. Hitherto the high-priced imported fruits have been consumed by the wealthy class, but the Bureau of Markets, United States Department of Agriculture, points to the significant fact that the wage-earning ability of the Chinese is gradually increasing. Market specialists conclude that it will not be long before the mass of the Chinese people will be ready to buy foreign fruits.

Japan is the sharpest competitor in the Chinese fruit market but should offer small resistance to a well-planned campaign by American fruitgrowers. The Japanese apples are far inferior to the American product and do not command the same prices. The Bureau of Markets recommends that the fruit dealer who seeks business in China use the trade channels already established. The Chinese are extremely conservative and do not welcome new systems to replace the ones they have in use.

One present drawback to foreign business with perishable products is due to the fact that the cold storage facilities at the principal Chinese ports are inadequate. The Chinese have understood the principles of cold storage and have practiced its method for centuries, but it has been only in recent years that her foreign business has been of a nature to demand large warehouses equipped to hold merchandise from other countries. It will be profitable for the American end of the industry to encourage the building of such warehouses where fruit can be held subject to the demand of the merchants.

The rate of duty on fruits is not sufficiently high to interfere with the development of the trade. For fresh and dried fruits the rate is 5 per cent ad valorem plus 5 per cent of the duty as a port charge. A box of apples valued at \$2.00 would pay a custom charge of ten and one-half cents.

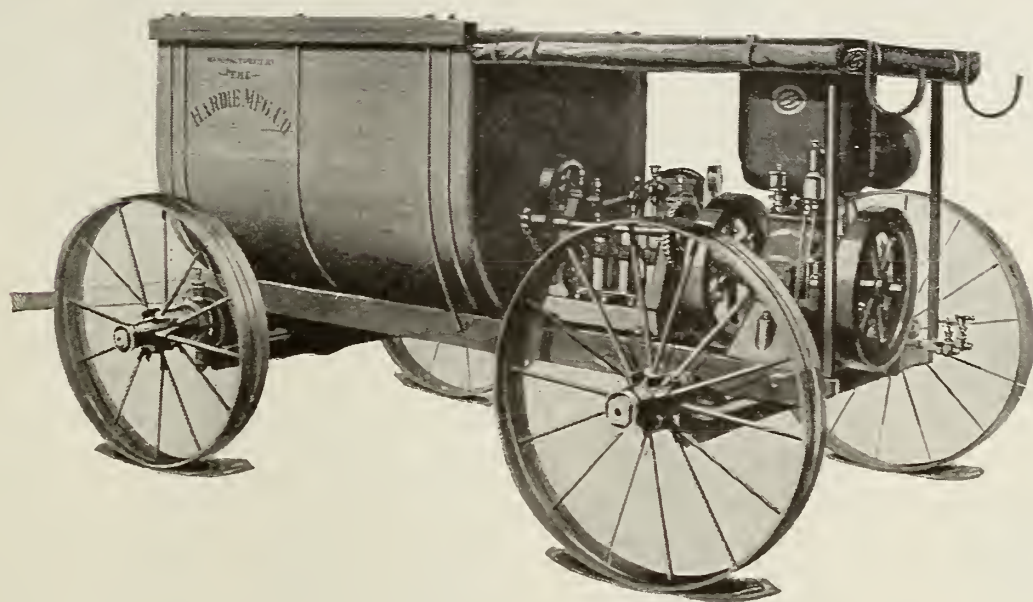
Additional facts of value concerning the opportunities presented to the American fruitgrower by this great undeveloped market can be found in Circular 146, United States Department of Agriculture. The circular gives an intimate and extensive report on the condition, customs, and possibilities of China as a market for American fruit products.



OLDEST APPLE TREE IN WASHINGTON.

Steps will be taken by the Washington Horticulture Association to preserve the original apple trees in Washington. The oldest tree is believed to be a seedling at Vancouver, Wash., planted in 1824. A question as to second honors in respect to age has arisen between the "Frazier tree" at Walla Walla and one at the mouth of the Alpowa River near Clarkston planted by missionaries 80 years ago and still bearing fruit.

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Pruning for Efficiency

By Hon. W. P. Sawyer at the Northwest Fruitgrowers' Conference, Spokane, Washington

I HAVE been asked to say something about pruning for efficiency, which I suppose means to induce the trees to bear fruit and of a quality that will command a market and good prices.

I hear a good deal of talk about "thinning out" versus cutting back," which I confess has always puzzled me. The question that always arises with me is: Why the "versus"? Why not do both?

My experience has been mostly with Bartlett pears and what little I shall say will be based altogether upon my experience and not at all upon theory. I make no claim to being an expert and I know very little of a professional's ideas of pruning.

A tree that will not set and develop a proper crop of fruit is not a good tree, neither is it a good tree if it has not sufficient strength to carry its load to maturity without props. Two things are essential to the development of either good fruit or good trees: Sunlight and air. Neither fruit nor fruit spurs and buds can be developed in the shade; so in instructing my pruners I impress upon them, first of all, the necessity of thinning out sufficiently to let the sunlight and air reach the trunks and whole length of the main limbs of the trees; this will cause the growth of fruit spurs all along the trunks and main limbs, where the trees have the greatest strength with which to support the fruit crop until it is fully developed, and these parts of the trees are stiff and rigid and protect the fruit from being slammed about and marred by heavy winds. With the light and air reaching all these parts the same ruddy attractive fruit is produced there as that which grows on the outside of the trees.

The next thing to explain to the pruner is the necessity for a strong frame that can carry the burden of a proper crop without props or strings on fully developed trees. This can be accomplished only by continually cutting back the new growth so that the limbs

will grow thick and strong in proportion to their length.

To secure the style of trees that I have described we begin by cutting the tree back to fifteen inches from the ground when planted. The next year we cut the new growths back to 12 to 16 inches in length and thin out to from three to six branches that will make a balanced head; cutting at all times to terminal buds that point out or against the wind. In most sections of this country the winds prevail very largely from one direction and the trees must be braced against these winds or they will soon be seen to be leaning with them—this is wholly unnecessary if proper care is used in shaping head and in pruning. I do not like a hollow center so I always try to have one of the main branches go straight up and then by careful selection of buds and cutting to them or to little branches that point either out or against the wind, we help the tree to spread out and stand up-right. If there are but three branches to start with the second year they should each be allowed to make at least two main branches, and after that I believe we would do best to allow no more long branches to grow, but keep these six main limbs clear of everything but short fruit spur branches. You can readily see how easy it would be to keep fruit grown on such branches all in the sun. Until the trees are practically developed we prune each year as I have described. No brush is allowed to grow on the main limbs and no clusters of sprouts are allowed on the ends of these limbs but every limb is pruned to one shoot at the point and in the developed trees we never allow any fruit buds to remain nearer than one foot from the end of a main limb; this is the weakest spot on the tree and the place where the wind can do most harm to the fruit. We do not allow the trees to grow taller than can be reached from a 12-foot ladder and all growth above that we cut back each year to one or two buds on one shoot and cut all

other shoots clear back to old wood. On the main spreading limbs we cut off clean, substantially, all new growth excepting fruit spurs and one shoot at end of limb and this we cut back to six or eight inches in length. In this way we prevent shading brush from ever getting established in our trees and avoid the necessity of cutting out old

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wood, which I do not like to do, but never hesitate to do when I find I have too many limbs and my tree is not sufficiently open. When cutting wood more than one year old I will cut a branch considerably shorter or longer than I would like to in order to be able to cut off where it branches, because when old wood is cut otherwise a great number of fine shoots are thrown out all of something the same length, making the end of the branch cut look more like a brush than the proper end of a branch.

This is not very long and it does not sound very scientific, but so far as I

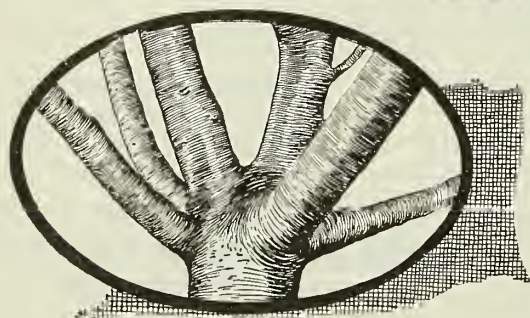
can think I have told you all I know about pruning. When we once understand why we prune, and what makes attractive fruit, then it is not so difficult to properly prune any kind of a tree, if we will just use our own good common sense and reasoning powers.

I have not told you why it takes the sun to put color and quality into fruit, nor is it necessary to do so since every fruitgrower knows from his own experience that it is a fact. Then the only thing of interest is to find out the best way to get your fruit into the sun, and to build a tree that can support it till the proper time comes to pick it.

Spreader Reduces Cost.

Lead arsenate spray of half the usual strength, combined with a spreader, proved much more effective than the usual strength—4 pounds to 200 gallons water—without spreader, in tests for codling moth at the Oregon Agricultural College experiment station. The spreader used was calcium caseinate, 12 ounces to 200 gallons of spray. The gain was due to the even, uniform coating of poison with the spreader, as against a blotchy spread without.

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Northwest Fruit Notes from Here and There

OREGON.

According to a recent report from Roseburg, Kenneth McKay, a well known orchardist of Yakima, Washington, and Hood River, Oregon, has leased from the Balfour Guthrie company of Portland approximately 300 acres of apple orchard land in the Sutherlin valley. Included in the lease are several thousand dollars' worth of equipment used to care and cultivate these orchards. It is understood Mr. McKay will erect a large packing house early in the coming year to handle the fruit and that extensive development of the industry in that section will be undertaken.

The Portland press recently announced the receipt at that port of several large cargoes of nitrates which will be used in Oregon orchards. Growers who are contemplating the use of nitrates are advised by the Oregon Agricultural Experiment Station that they can learn much about the use of nitrates by applying to the college for the station bulletin on that subject.

Oregon apples were sent to President-elect and Mrs. Harding to brighten their Christmas. The apples were sent from Hood River and consisted of a box of selected apples of assorted varieties. The fruit was sent to Mr. Harding by W. H. McClain who formerly resided in Marion, Ohio, the future president's home city. President Wilson received a box of fine Mosier apples forwarded to him by G. L. Davenport, a Mosier orchardist.

W. H. Paulhamus, president of the Puyallup & Sumner Fruit Growers' Canning Company, in replying to a recent inquiry as to what the company would pay for fruit in 1921 says

that the organization is now contracting for Munger black raspberries at \$140 per ton; gooseberries at \$100 per ton; rhubarb at \$20 per ton; red and black currants at \$140 per ton, and Monmorency sour cherries at \$100 per ton, f. o. h. at their Albany cannery. The company at the present time is not quoting a price on loganberries and sweet cherries.

The completion of the harvest of the 1920 cranberry crop in Clatsop county is reported to show a total of something over 6,000 bushels, an amount considerably below what was expected earlier in the season. Wet weather during the picking season caused a large percentage of the berries to become soft, entailing a considerable loss.

A report from Salem is to the effect that split prunes, which heretofore have been almost valueless except for local consumption, are being shipped from Marion County to eastern states, where they are commanding 8 cents a pound. States bidding for this variety are Montana, Wyoming, Idaho, North and South Dakota. Arrangements are also in progress whereby large shipments of prunes may be sent to Hamburg, Germany, the cost of transportation being 56 cents for each 25 pounds.

A merger was recently completed between the Jackson County Farm Bureau with headquarters at Medford and the Ashland Fruit & Produce Association whereby the two organizations will work to promote the agricultural and horticultural interests of that district. The cooperative movement between the two organizations was brought to a satisfactory conclusion at a meeting held recently by the directors of the respective concerns.

Strawberry growers of Clackamas County have taken the necessary steps to organize a strawberry plant growers association. The strawberry plant industry in that section is said to amount to more than \$90,000 annually and to be increasing.

Due to the claim of California horticultural officials that strawberry plants being shipped from some sections of Western Oregon were affected with weevil, plants shipped from Oregon to California hereafter will first be inspected in the former state by experts before shipment. This action was taken by the Oregon State Board of Horticulture after a meeting held recently with L. A. Strong representing California quarantine officers. An immediate inspection will also be made of strawberry fields in several of the Western Oregon counties, under the direction of B. D. Fulton, an expert from the Oregon Agricultural College.

According to a report issued about the 15th of the past month the 1920 Hood River apple crop was at that time practically in the hands of the shippers. The report says that the total output will run more than 100,000 boxes above pre-harvest estimates. The Hood River Apple Growers' Association which estimated its harvest at 850,000 boxes expects its total receipts to be 950,000 boxes. The valley's total crop this year is estimated at 1,350,000 boxes. The association had shipped up to December 15, 50 per cent of its holdings. No pronounced car shortage has occurred at Hood River and it is expected that the remainder of the crop amounting to about 500,000 boxes will be shipped without any difficulty.


According to an announcement of the Apple Growers Association, many members of the organization are expressing a keen interest in raspberries, loganberries and pears, says the Hood River Glacier. Growers express a de-

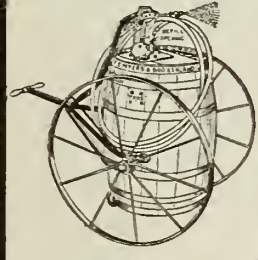
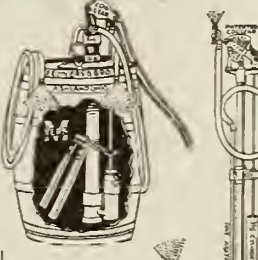
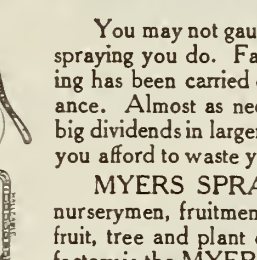
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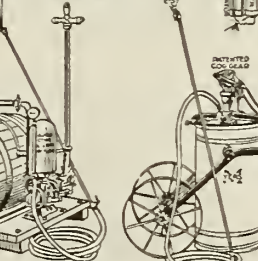
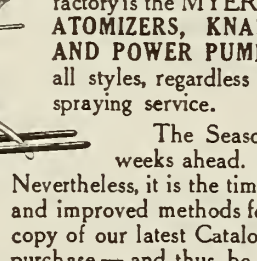


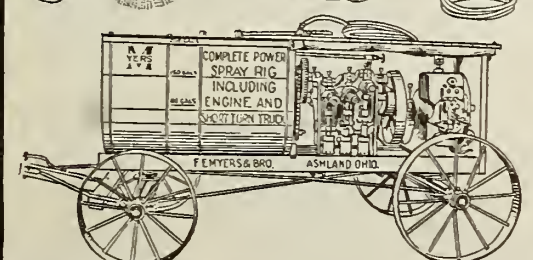




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sire, it is stated, to diversify their orchard holdings, especially where, owing to the injured condition of trees from the freeze of last winter, it is necessary to remove certain blocks of trees and to reset to fruit or berries. The association is making a survey of acreage that will be available for new plantings this spring and is obtaining data on proposed new fruits.

Forty thousand acres of prunes are now to be found between Portland and Ashland, as compared with 10,000 acres a few years ago, according to a survey made recently.

The Oregon Agricultural College Experiment Station notes that it cost a Hood River grower 76 cents a tree to spray his orchard seven times in the season, and he got 95 per cent fruit free from leaf roller, codling moth and

apple scab injury. His neighbor under like conditions paid 55 cents a tree for seven sprayings. He saved 21 cents in spraying, but lost 104 cents per tree in damaged fruit.

A delegation of Rogue River valley orchardists recently visited California, for the purpose of investigating the long pruning system being studied by the California State Agricultural College. As a result of the trip it is stated that the new system may be adopted with some modifications in the Rogue River section.

Raspberries and pears are being urged at Hood River as the fruit crops to plant where orchards were irreparably damaged by the freeze last winter. To inform growers on this question experts will investigate and discuss the matter with the growers.

WASHINGTON.

W. C. Dumas of Selah announces a remarkable yield last season from two Gano apple trees. From one tree 61 boxes of fruit were picked and from the other 50 boxes.

Motor trucks are moving a considerable quantity of apples from the White Salmon district to Portland this year. Growers who use the motor truck service say it is quicker than shipping by rail and less expensive as the fruit is delivered direct to the buyer and requires less handling.

More than 50 per cent of the berry acreage of the Puyallup-Sumner valley has been enrolled with the Pacific Berry Growers, a new agency being organized in that district according to one of its officials. To determine the exact berry and fruit acreage in the district a census will be taken. The president of the new organization is E. R. Thomas and the treasurer is George Spinning.

Grays Harbor County orchardists should cut down all their apple trees, except a few for their own use and plant cherries and pears, according to an announcement of County Horticulturist Payne. Mr. Payne takes this stand on the ground that Western Washington cannot compete with Eastern Washington in growing apples commercially, because climate and soil are both against successful apple growing.

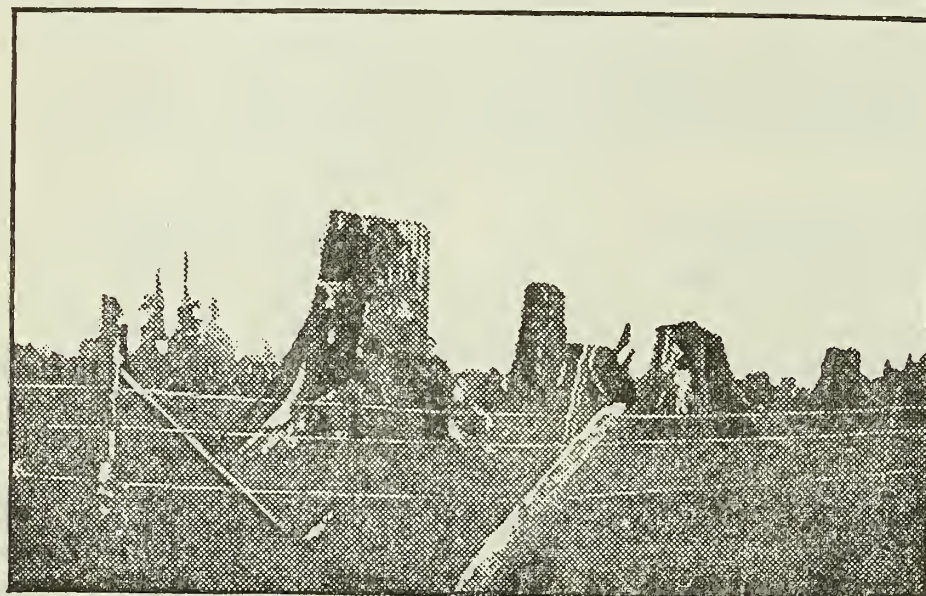
In regard to framing a tariff law that will protect the fruit industry of the Northwest, a matter recently taken up by W. H. Paulhamus, of the Puyallup & Sumner Fruitgrowers' Association, Mr. Paulhamus has received word from Senator W. L. Jones of Washington that he can be counted upon to do all in his power to have such a law enacted. He suggests, however, that Mr. Paulhamus or someone equally familiar with the fruit industry take up the matter with all the senators and representatives.

Believing that the beekeeping industry of the state has assumed such proportions that it deserves more recognition from state authorities the Grays Harbor Bee Keeping Association will send a petition to the legislature asking for an appropriation to fight diseases which are affecting the bee colonies of the state.

With the thought in mind of helping home industry as well as observing the Christmas spirit prunes from Clarke County were sent into every state in the United States during December as present by persons living at Vancouver, Wash. The prunes were especially packed in ten pound boxes under the brand name "Mellowwest," recently adopted by the Washington Growers' Association.

The California Nu-Fruit corporation has been organized at Yakima with W. H. Cloud, food specialist for 25 years, as president; F. M. Raymond of the Yakima Artificial Ice and Cold Storage Company, vice-president, and A. V. Hooper, secretary-treasurer. The company will at once begin manufacture of apple toasties, a new food product. The toasties are made from dehydrated apples which are electrically toasted until the slices become golden brown crumbles.

The Wenatchee District Cooperative Association has been organized. Plans for a membership of 65 per cent of the Wenatchee growers, a fund of \$150,000 to be spent in advertising a standard brand, arrangements to



Land Like This *Will* GROW CROPS!

YOU have some land like this on which you are paying taxes and getting no returns. Make it *produce*. Get the stumps out with



or Repauno Stumping Powders

the greatest time-savers, labor-savers and money-savers known for land-clearing, and have *more* acres ready for the plow and ready to bring in money.

Clear More Land in 1921

Last year was one of the largest land-clearing years in this state. During 1921 an even greater acreage will be cleared and cultivated largely thru the use of explosives.

Make your plans **NOW**—many of your neighbors figure on cleaning up more acres than last year and are already placing their orders for Du Pont or Repauno Stumping Powders for spring delivery.

See your local dealer. Write for our free book "Developing Logged-off Lands" describing the use of explosives for land-clearing, tree-planting and ditching.

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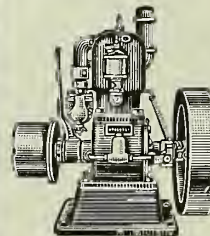
Portland, Oregon

Spokane, Washington

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Built light, BUILT RIGHT. That means counter balanced crank shafts, ground cylinders and pistons, throttling governors, automobile carburetor, friction clutch and Water Circulating Pump. ONE engine for ALL kinds of work. Four-horsepower runs sprayer, wood saw, potato digger, grain binder, pumps, ALL kinds of work up to 4 h.p. Also made in 8, 10, 15, 20 h.p. 2 cylinder for heavy work.

4 h.p. weighs only 190 lbs.
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Full Stock of Repairs at Portland

create a working surplus large enough to meet all requirements, and the establishment of connections in the East to handle a large percentage of the tonnage, have been completed by the Wenatchee District Cooperative Association, according to H. G. Boehlke, president of the newly formed fruitgrowers' association, who was in Spokane recently. "We have already signed up 735 carloads of the 1921 crop in the valley, and we have every reason to believe that we are going to obtain the support of 65 per cent of the growers in the four counties comprising our district," he said. "Three cents will be levied on each box of fruit to pay the advertising bill, which will be spent advertising one brand for the entire district." The chief features of the plan adopted by the Wenatchee District Cooperative Association are the centralization of all authority in trustees and officers. All growers who join must sign up for five years, and must place their entire crops in the hands of the association's officers to dispose of to the best advantage. Pools are provided for, settlement for which is to be made at fixed dates, and all returns are to be made equally to growers according to the number of boxes of fruit sold.

Reports that winter apples held in community storage in the Wenatchee district are damaged are emphatically denied by District Horticultural Inspector Darlington, who has made careful examination of Winesaps in the district, both in the orchard and track storage. Mr. Darlington reports that there are no indications of detrimental water, core or other breaking down of the cells.

Apple shipments from Yakima continue to decrease, only 262 carloads having been rolled to the market during the week ending December 12 as compared with 367 the previous week. Total apple shipments for this season are 5,708 cars with a valuation of about \$8,000,000. There have now been 7,676 carloads of fruit rolled from the valley this year, compared with 13,147 cars at the corresponding time a year ago.

Regarding car needs for fruit of the Wenatchee district next year Edwin Swith, manager of the Wenatchee Valley Traffic Association, says: "Wenatchee requirements for 1921 without doubt will be from 40 to 60 per cent greater than they were this year. Orchardists advise that trees were never in a better con-

dition to produce a bumper crop and 15,000 carloads for the district is being freely mentioned. To meet this there promises to be about a 10 or possibly 15 per cent increase in new refrigerator equipment on the railroads.

IDAHO.

W. M. Crapp, manager of the big plant of the Oregon Packing Company at Lewiston, Idaho, has closed the plant until the beginning of the next cherry season. Although the market for canned goods was unfavorable last season, the plant did a big business and recently has made large shipments. Nearly 1,000 tons of tomatoes grown locally were packed, a great increase over last year, when growers were just beginning to raise this crop in commercial quantities. The cherry pack ran about 500 tons and several hundred tons of other fruits were packed, including apples, which furnished the cannery with steady work during the fall. The payroll of the plant is \$60,000 annually.

"The growing of seed potatoes has become an established industry in Northern Idaho, where only a few years ago potatoes for this purpose were not grown," said E. R. Beennett of Boise, Idaho, field horticulturist of the state university of Idaho, while in Spokane. "The whole thing has been in the growing of a single variety," he added. "They have united on the Nette Gem, the potato which has made the Northwest famous for its potatoes, and the result is that they are sold out at a premium."

Leroy Weston, manager of the Spokane Fruit Growers' Company, states that the apple packing season has closed at Coeur d'Alene, Idaho, 40 miles east of Spokane, and that 81 cars of apples were shipped from the Coeur d'Alene district as follows: Forty-eight cars from Dalton Gardens warehouse, 21 cars from the Coeur d'Alene warehouse and a miscellaneous shipment of 12 cars by the independent shippers of Hayden Lake-Dalton Gardens district.

Mulching of trees and shrubs with manure late in the fall tends to protect the roots from freezing and thawing and also helps to hold moisture in the soil.

Ship Your Fruit TO Europe BY Holland-America Line Refrigerator Steamers

Regular Monthly Direct Freight Service
between

Portland, Oregon,
AND
United Kingdom and
Continental European
Ports

S.S. "EEMDYK," Late January
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(Both 12,000 tons D. W.)

Steamers especially equipped with large cool-rooms and refrigerator plants for transportation of fruit, fish and other perishable commodities.

Oregon-Pacific Company
GENERAL AGENTS
Wilcox Building Portland, Oregon



Frost Insurance

If you carry insurance on your life, your auto, your property against fire, why not take steps to insure your crops against frost damage?

Scheu Smokeless Orchard Heaters Are Frost Insurance!

The experience of growers all over Southern California, Texas, Florida and other points of the U. S. where frost protection is needed is proof that Scheu Smokeless Orchard Heaters are the most successful form of frost protection.

Scores of orchardists have written enthusiastic letters recommending this heater. One ranch has used over 1000 of them for three years with entire satisfaction.

MAIL THIS COUPON FOR FULL DETAILS

Made by

Whiting Mead Co.

Manufacturers of
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A complete banking service is offered you through our various departments.

Our officers welcome the opportunity of advising you how best to use these departments. Or a little booklet outlining the functions of each department may be had from the tellers upon request.

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The first national bank west of the Rocky Mountains

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Established 1885

Beekeepers Profit

—by buying supplies now and during winter spare time get ready for coming season.

Make up an order for Foundation, Frames, Wire, Hives, etc. and get our low price—then order or not as you see best.

When you come to us you come to Headquarters for Bee Supplies—expert in charge. Put your problems up to us.

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How You Can Get Better Fruit's Apple Packing Chart

BETTER FRUIT's apple packing chart printed on cardboard so that it can be hung in the packing house, will be mailed to anyone desiring it on the following terms:

One card FREE with a new subscription to BETTER FRUIT.

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Portland, Oregon

Notes Oregon Growers' Association

With the rather bad weather to be expected during the next few weeks, the fruit grower can put in his time on inside work, such as mending boxes. It is also suggested that now would be a fine time to re-model dryers if necessary, rather than to wait until the busy season.

Growers who have pruning might begin now to relieve the rush of work next spring.

Good results are obtained by the application of the nitrate of soda on loganberries during the month of March. Some report increased diameter as well as length of cane. Those who intend to use this fertilizer should be placing orders.

The business of the Oregon Growers' Cooperative Association has assumed such proportions that during the month of November, checks were issued for \$540,199.23 by the association and its affiliating company, the Oregon Growers' Packing Corporation, according to a report of W. I. Staley, secretary and treasurer.

The good results of advertising and cooperation were shown in an address recently delivered by C. I. Lewis of the Oregon Growers' Cooperative Association, before the State Horticultural Society, in session at Eugene. Four years ago, Mr. Lewis said, the peach growers of California were a discouraged lot. Many trees were grubbed out as peaches were selling for two cents a pound, below the cost of production. The growers got together, formed a cooperative association and by judicious advertising, created a demand for certain peaches. This year the crop was sold for \$8,000,000, an average of \$340 a ton to the grower. The California Peach Growers' Association is now four years old. It has 6,500 members and controls 40,000 acres. Cooperation among growers, Mr. Lewis said, had in four years brought the peach industry in California from almost financial ruin to an established, prosperous business.

The growing of filberts is urged by the Oregon Growers' Cooperative Association, as there are just two states growing them commercially, Oregon and Washington. Already there is an active interest in filberts and many are preparing to put in tracts of from five to twenty acres. There are now only from 40 to 50 small tracts in Western Oregon. Filberts grown in this state are of a much finer quality than those imported from Spain, Sicily, and Turkey. There is a commercial crop about the fifth year from planting. As there are fully 10,000 acres of logged off land in Oregon adapted to the growing of filberts and English walnuts, it is predicted that within a few years, the growing of nuts will be one of the great industries of Western Oregon.

What They Are Doing in California

According to advices to the California Department of Agriculture, on December 18 there will be a total of 2,200,000 boxes of apples shipped from the Watsonville section this season or approximately 300,000 boxes less than was shipped last year. There is in cold storage about 200,000 boxes, loose and packed, at Watsonville and about 400,000 boxes in other cities throughout the state, mostly in San Francisco and Los Angeles. In addition there is some stock in common storage.

Opportunity for Pacific Coast orchardists, vineyardists and ranchers, for the disposal of surplus production, in the markets of the Far East, will shortly be afforded by the installation of a line of fast, modern, combination freight and passenger carriers, to be operated from San Francisco to Manila and East Indies by the Pacific Mail Steamship Company, it is officially announced. This highly improved service will be initiated by the Shipping Board steamers "Creole State" and "Wolverine State," these vessels being due to arrive from the Atlantic in January and February. The announcement is of special interest to the fruitmen of the Pacific Coast, because the ships were, at the suggestion of the Pacific Mail Steamship Company, particularly designed to care for the transportation of the ranch production of the Western Slope, and marks the beginning of a service which provides the necessary refrigerating space for commodities that could not be otherwise sent out of the United States. The ships will be operated in the Manila-East India Service

BEST SERVICE-
QUALITY & PRICES



PERFECTION IN
**FRUIT
LABELS**

THE
SIMPSON & DOELLER CO.

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E. SHELLEY MORGAN

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WE CARRY—AND CAN SHIP IN 24
HOURS—STOCK LABELS FOR PEARS,
APPLES, CHERRIES & STRAWBERRIES.

Established 1882

F. W. Baltes & Company Printers

WE print anything from the smallest to the largest and always welcome orders of any size or quantity, giving prompt, personal and efficient service.

Mail or phone inquiries are solicited. We do not specialize—experience and equipment enable us to print everything equally well. We render service in preparing copy and illustrations and furnish plans and estimates for catalogs, booklets, publications, billboard and any other kind of advertising.

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which was established by the Pacific Mail Steamship Company.

The S. S. "Creole State" sailed for San Francisco from Baltimore on December 27th. Arriving at San Francisco on January 15th, she will load cargo, and on January 26th will be dispatched on the Pacific Mail's direct express communication with the Philippines and India. The S. S. "Wolverine State" will sail from San Francisco on February 25th. Direct express communication to Manila will be made by the new liners in 22 days. The time from Calcutta will be 34 days, the "Creole State" and "Wolverine State" making the fastest time in history of Pacific trade with the Far East. Leaving San Francisco the ships will reach Honolulu on the afternoon of the sixth day; the Philippines in 22 calendar days, and arrive at San Francisco from Manila in 20 calendar days; Singapore will be reached in 28 calendar days from California; Colombo in 34 days; Calcutta in 39 days; and will make San Francisco, homebound, in 34 days, from India. Sailings will be maintained every 30 days from San Francisco, excepting when Sunday interferes when sailings will be on the Saturday preceding.

Bits About Fruit, Fruitmen and Fruit Growing

Cheering words were recently brought to Northwestern apple growers by A. B. Hull of Gasport, N. Y., production manager of the Friend Sprayer Company, who visited F. A. Olmstead and A. B. Bennett who are the Oregon and Southern Washington distributors for this company. According to the Hood River Glacier, orchardists of the Northwest, he says, should not be depressed over the situation that now applies in the apple market.

"It must be remembered," says Mr. Hull, "that the big eastern commercial orcharding districts this year produced a record breaking apple crop. As a result all eastern points of distribution have been glutted as never before in history. Naturally, the apple market has dropped. It is a wonder that it has held to the point maintained. Even as I was leaving the East, however, this heavy glut of barrel stock and bulk apples was being cleaned up and the outlook was much brighter for the high class box product of the Northwest. It has been the experience of the past that big crops have never repeated, and we may expect a smaller or moderate crop of apples in the East next season, whereas the West is due for a bumper yield. I find that most of the representative Northwestern growers are viewing the orcharding situation from a general angle, and are not allowing the present condition to alarm them. Growers are going right ahead in laying out appropriations for better equipment, and care of fruit tracts will not decline. We are looking forward to a much increased business."

Losses from freezing of Northwestern apples were extremely heavy last winter. During December and January, 1919-20, claims of \$3,000,000 were presented to railroads by apple shippers of Washington, Oregon and Idaho. Prevention of loss by freezing in transit seems to depend largely on improved methods of heating cars. Serious losses occur also in shipments of potatoes. Information and advice on lining, heating, loading box cars for potatoes in winter have been supplied by the U. S. Bureau of Markets to shippers and producers and the methods recommended have been extensively adopted. A heating system suitable for installation in ventilator and refrigerator cars has been designed by investigators of the U. S. Bureau of Markets, and has been approved by various railroads as a standard for the equipment of refrigerator cars under conditions which warrant the building and operation of these cars. The experimental cars equipped with this system of heating will be used in comparison with cars equipped with portable heaters.

The big stride that the fruit industry in Oregon has made was called attention to recently by W. S. Brown, chief in horticulture at the Oregon Agricultural College, in an address recently before the Western Society of Naturalists which met at the college at Corvallis.

"From 1850 to 1870 fruit was so scarce in Oregon," said Professor Brown, "that fabulous prices were received, one box of apples having been sold for as high as \$75, while in 1855, 6000 bushels of apples sold for prices ranging from \$20 to \$30 a bushel. In 1909 there were 4,000,423 bushels of fruit in the state, valued at \$3,340,000, while in 1919 there was produced, according to the best information obtainable, some 9,000,000 bushels of orchard fruit, with a valuation of approximately \$16,000,000. The total fruit crop of the state for

1920 will run not far from \$25,000,000 to \$30,000,000. There are many vexing problems ahead of the industry, and there always will be, but taking everything into consideration, the outlook seems very fair."

The use of cider in the home by its manufacturer, even after it has become intoxicating is lawful and without the bounds of the prohibition enforcement act, according to an opinion submitted by Attorney General Palmer and recently made public. The opinion is in conflict with the regulations of the bureau of internal revenue which states home made cider must be "non-intoxicating in fact," although not necessarily containing less than one-half of one per cent of alcohol. The Anti-Saloon League, it is reported, has asked the attorney general to reconsider his ruling on cider, declaring that the eighteenth amendment prohibits the manufacturing of intoxicating liquors for beverage purposes in the home or elsewhere and that Congress fixed the alcoholic content of fruit juices for home use at one-half of one per cent.

Cannery Notes

Additions of two new departments, jam and preservers and vegetable canning, to the A. Rupert Company, incorporated, of North Puyallup, was announced recently at Puyallup,

Wash., at a banquet when 125 representative business men and berry growers from the valley were guests of the company. Representatives of the Puyallup Valley Fruit Growers' Union and the Pacific Berry Growers' Association were also present. W. A. Frost, president of the A. Rupert Company, to meet whom the banquet was arranged, made the announcement offering for sale to the berry growers and business men stock in the enlarged corporation. This is the first departure of the Rupert company into the jam and preserve business.

The Altoona Packing Company has plans well under way and construction started on a large modern cold storage plant, which it is building at Astoria.

There will be many important topics of discussion at the Fourteenth Annual Meeting of the National Cannery Association to be held at Atlantic City, Jan. 17-21. The Canning Machinery & Supplies Association, and the National Canned Foods and Dried Fruit Brokers' Association will assemble at the same time. A new feature to be introduced at the 1921 convention, and of particular interest to the consumer, will be a canned foods demonstration. Because of the unsurpassed facilities afforded by the great pier space the exhibit of machinery used in canning, a display made

It costs no more



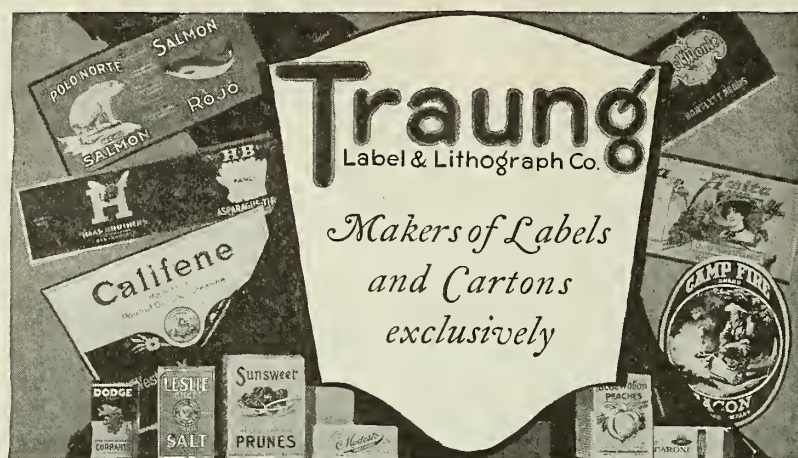
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Let our Master Artists improve your label, package and advertising designs. Your future cost will be no greater.

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Into the homes of the nation go quality cartons and labels of Traung manufacture, containing the quality products of the West—names and brands that are familiar national household buy-words. A good product and a Traung carton or Traung label, are the first two important steps in successful production and merchandising. Get in your order now to make sure of satisfactory deliveries.

LABELS and CARTONS

San Francisco • Stockton • Sacramento • Seattle • Portland • Fresno

American Grown Apple Seedlings

STRAIGHT AND BRANCHED
ALL GRADES

Frequently Sprayed. Absolutely Free from Insects or Diseases

CAR LOTS TO CENTRAL POINTS
Will Exchange for Such Stock as We Need

Now is the Time to Grow High Priced Apple Trees

ALSO A
General Assortment of Foreign Fruit Tree Stocks
(Apple, Pear, Mahaleb, Mazzard, Plum, Quince, Etc.) All Grades

We will have a Complete Line of General Nursery
Stock in Storage for Spring Trade

Shenandoah Nurseries

D. S. LAKE, President

November 1, 1920

SHENANDOAH, IOWA

by the Canning Machinery & Supplies Association, will be more elaborate than ever before. Heretofore this exhibit has not been open to the public, but at Atlantic City the exhibition will be open evenings to the general public.

Expenditures by the Libby, McNeil and Libby Company last year at Yakima, Wash., according to the annual report by George B. Kile, superintendent, exceeded \$60,000. The cannery employed an average of about 400 people during the canning season, from May until December, and the total payroll amounted to \$225,000. Approximately \$325,000 was paid direct to farmers for produce, including spinach, cucumber pickles, cherries, pears and apples. While no definite plans for extension of the plant, which now includes cannery, warehouse, apartment house, eight cottages and tent camping grounds, have been made, indications are that some material improvements will be made. The cannery is making efforts to induce farmers to plant more out-season crops, such as early spinach, in hopes of lengthening the season during which the huge plant may be operated. During the season about 120 tons of spinach were canned, 110 tons of pickle cucumbers were made into 1,200 barrels of pickles, 742 tons of cherries were canned or made into maraschinos, 2,000 tons of pears were canned and about the same amount of cull apples. The last of a 10,000-case order of canned apples for the United States government was recently shipped.

The Skagit Canning Company, located at Sedro-Woolley, Wash., has just closed a very successful year. Work on this cannery started about the middle of April and the building was completed the first of July. Consequently no strawberries were handled, but practically all other fruits and berries were canned. In addition a specialty was made of canning both beans and beets. A total of approximately \$100,000 was paid out in the purchase of fruits and vegetables. Preparations are now under way for caring for a much larger run next year. Stock in this cannery is owned principally by local business men and farmers. J. W. A. Myers, formerly superintendent of the Pride berry farms of Bellingham, is the general manager.

J. W. A. Myers, manager of the Skagit Canning Company at Sedro-Woolley, Wash., heads the recently incorporated Skagit Berry Farms Company. This organization has just completed the purchase of a 100-acre farm on the outskirts of Sedro-Woolley, which it is intended to immediately develop into a diversified berry farm, but specializing chiefly in raspberries and loganberries. This farm is one of the best in Skagit Valley for this purpose, in regard to location, site and soil.

During the year just closed over 1,000 acres of berries were set out in the fertile Skagit Valley, Washington. These plantings consisted primarily of strawberries, raspberries and loganberries, with small scatterings of other kinds of berries. Considerable interest was also shown in the planting of sour cherries. Indications at the present time point to more than doubling this acreage during the coming spring. The Skagit Valley contains hundreds of acres of sandy loam, the ideal berry soil. During 1920 two canneries were erected in Skagit County, primarily to take care of this berry acreage: the Skagit Canning Company at Sedro-Woolley and the Burlington Canning Company at Burlington, Wash. Both report very successful seasons. Indications point to the erection in the near future of either another cannery or a juice factory receiving station in Mount Vernon.

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BELL & CO.

Incorporated

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Fruit and Produce

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PORTLAND, OREGON

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COVENT GARDEN, LONDON, W.C.2

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TRADE MARK

The Largest Firm of Fruit Salesmen in Great Britain

(ESTABLISHED OVER A QUARTER OF A CENTURY)

SALES BY PRIVATE TREATY ONLY (Gives best results)
COMMISSION THE EXCLUSIVE BASIS (Purchase propositions cannot be considered)

ADVANCES OFFERED TO COVER FREIGHT CHARGES

Special Facilities for Handling Consignments from Co-operative and Other Organizations

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SPRAY WITH DORMOIL

The Miscible Oil for Dormant Use

FOR THE CONTROL OF

**Leaf Roller, Scale,
Aphis, Red Spider,
Blister Mite, Pear Psylla,
Mosses and Lichens**

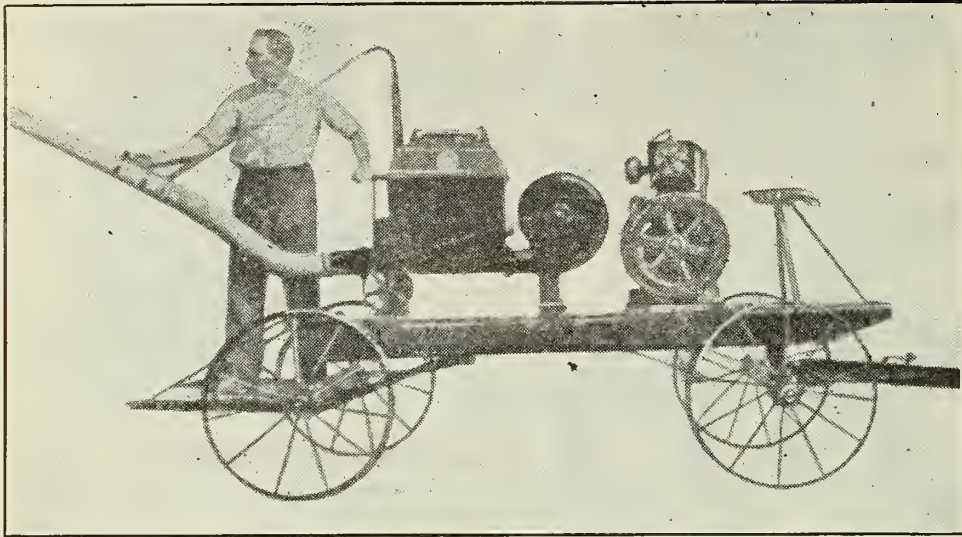
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State Distributors of the "FRIEND" Sprayers



THE NIAGARA DUSTER—THE CROP PROTECTOR

The DUSTING METHOD becoming better understood, is being adopted by many of the progressive growers in Oregon and Washington, and of course, they use the NIAGARA DUSTER.

A County Agent in the State of Washington writes, under date of November 4, 1920: "We used this machine on 160 acres of apples and came through with less than 2% codling moth infestation. This is the smallest amount of infestation that has been observed in this orchard since it came into bearing."

An Oregon grower packed 20,000 boxes apples with less than ten boxes affected with worms.

You, too, will join the Duster boosters, but right now you need a STRONG, RELIABLE, SULPHUR SPRAY.

Niagara Soluble Sulphur

leads the world in sulphur sprays. Equally effective as lime-sulphur solution,—double the value of dry lime-sulphur,—costs less than either. Excels in control of SCALE, MOSS, PEACH BLIGHT, CURL LEAF, etc. If you can not get NIAGARA SOLUBLE SULPHUR locally and at the right price, write me. I will see that you get it and get it RIGHT.

F. A. FRAZIER

Distributor Niagara Products

342 Washington Street, San Francisco, Calif.



Better Seeds—Bigger Yields

Land is worth too much to let any of it go to waste, and labor is worth too much to experiment with uncertain trees and seeds. Plant good field and garden seeds, and be sure to have plenty of small fruits. They will pay you.

"The Most Wonderful Tomato Ever Grown"



That's what one of my customers says of Beebe's Early Prolific. It is a wonderful bearer beginning to bloom when only 6 or 8 inches high. Fruit is as large as any of the early varieties, almost perfectly smooth and of superb quality. Very few seeds, making them excellent for slicing. Splendid keeper and good for shipping. Bears from 10 days to 2 weeks before any other and continues to bear until frost. Stands hot, dry weather better than other sorts. You will make no mistake by planting some of these. Fully described in my Catalog sent free.

Perfection Currant—In my garden this is the best bearer, the largest, sweetest and easiest to pick. Rich, mild flavor, less acid and few seeds.

Sugar Beets—Every farmer should plant a small patch and make his own syrup. Easily grown and syrup easily made. For stock feeding Sugar Beets are superior to Mangels.

New Kherson Oats—Ripens two or three weeks earlier. Stiffer straw, that will stand strong winds without lodging. Complete Catalog of Trees and Seeds sent free. (17)

SONDEREGGER NURSERIES AND SEED HOUSE

80 Court Street, Beatrice, Nebraska

Sonderegger Seeds and Trees Grow

Stock Influence on Scion, Etc.

Continued from page 4.

changes are the indirect result of a particular stock or the direct effect of the complicated changes wrought by the environment. Opinions on these remain still very vague and contradictory.

As early as 1879 Budd reported that he had many pages of evidence accumulated in his files stating that the stock of top grafted apples has an influence not only in respect to hardiness and thrift of the scion, but the size, flavor and quality of fruit in particular.

Much, though very scattered and contradictory, opinion on this question is to be found in the transactions of many state horticultural societies. These evidences are, however, too unreliable to be marshaled as facts from which general conclusions could be drawn.

1. In respect to particular influences, Hedrick thinks that the color of the fruit may be changed by the stock, but that this cannot take place in respect to the characteristic color of the fruit. The color is brightened or diminished by the earliness or lateness of maturity of the wood, which can be influenced by the stock. As a particular instance he refers again to the orchard of McIntosh apples top grafted on Oldenburg, which matured its fruit nearly two weeks earlier than McIntosh on standard stocks, and, therefore, were much brighter in color.

2. There is hardly any doubt that the size of fruit is in some cases increased as a result of top working. Any beneficial influence exerted by the stock on the scion in respect to health and increase in vigor will show itself most readily in an increased size of the fruit.



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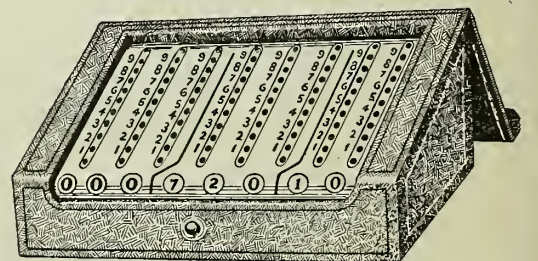
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Again, because of the nature of top working, each of the scions will behave like individual young trees, and thus, as in the case of most young trees, the first crops will be of a larger size than the subsequent ones. And it is the first crop of the top worked tree which attracts the most attention and from which often rash conclusions are drawn. This, however, does not exclude the often observed cases of a general and permanent increase of the size of fruit of many varieties as a result of top grafting.

J. A. Burton of Indiana reports that Grimes and Jonathan trees grafted on

Walbridge bear considerably larger fruits than when grown on seedling roots.

Many additional instances of an increase or decrease in size because of top working is to be found in transactions of many state horticultural societies. Other cases reported by practical fruit growers will be found below.

3. In respect to a change in eating or keeping quality of fruit because of top grafting, we have many reliable instances reported with grapes and other fruits grown in England through the pages of the "Chronicle." In respect to the causes of a change in quality of

fruit as a result of top working, Dr. Lindley, editor of the above publication, says that "this may be conceived to happen in two ways: either by the ascending sap carrying up with it into the scion a part of the secretions of the stock, or by the differences induced in the general health of the scion by the manner in which the flow of ascending and descending sap is promoted or retarded by the stock."

Many instances of a change in the eating quality of many varieties when top grafted may be found in the transaction of Iowa and other state horticultural societies. Other additional



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cases solicited by means of the above questionnaire will be given later.

Hedrick believes that larger, crisper, and juicier fruits with an increased or decreased degree of sweetness or sourness can be grown on some stocks than on others, but he does not agree with the opinion often expressed that the characteristic flavor of the fruit is changed because of the use of certain stocks.

The whole question seems to be of a very complicated nature and the observations very subjective, especially in the case of apples. Thus hardly any general rules can be drawn from evidence on hand.

This is more true if we consider the keeping quality of the apple as influenced by the stock. This question, though of great economic importance, has not come under general observation long enough to allow any opinions to be drawn from the scanty information that has been precipitated here and there. In general it can be said, however, that the keeping quality is not materially altered by the use of a certain stock.

Most recent opinions of practical horticulturists on the question of the influence of the stock on the top grafted apple, as solicited through the above questionnaire gave the following answers:

Has fruit been modified in respect to	Yes	No
Color	30	46
Size	48	41
Quality	22	45
Keeping quality	19	46
Total	119	181

Of these, there were thirty replies stating specifically that the size of fruit has been increased because of top working. Other seven growers are of the opinion that the effect on fruit is only an indirect one—by means of modifying the general health and vigor of the tree.

From these replies it is seen that while 39.5 per cent of the total answers received expressed the belief that the apple is influenced in respect to color, size, quality and keeping quality of the fruit, 60.5 per cent of those replying are of the contrary opinion.

As seen, a majority of the replies indicate that the size of fruit has been increased because of top working, while there are nearly as many who do not think so. The second most observed effect seems to be that of change of color of fruit. Yet only thirty people replying believed this to be the case, while forty-six are of the contrary opinion. But most of the replies state a negative belief concerning the change of eating and keeping quality of the fruit.

These answers seem to agree quite well with the opinions of well known

horticulturists of this country. While there seems to be more or less change in size and color because of the use of different stocks, there is but little evidence that the quality and especially keeping quality has been altered. Judging from the specific instances quoted

above, it would seem that the stock affects in many cases the flavor, especially acidity of the fruit. This appears to be particularly true in cases where there is a great difference in this respect between the fruit of the stock and the scion.



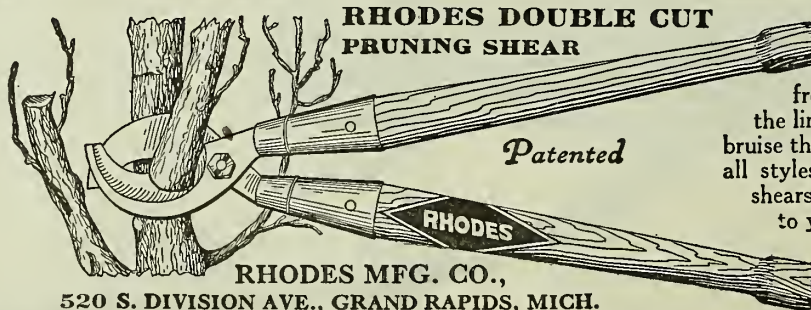
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With the Poultry

Inquiries Answered — Contributions Solicited

INCUBATORS SAVE TIME AND MONEY.

An incubator brooder is an important asset to every poultry breeder. The time to buy an incubator is in the fall or the early winter months, before it will be needed. By adopting this plan the purchaser can give himself a little time to learn something about operating the machine. In fact it is a good idea to make several experimental hatchings before the apparatus is put to the test at its full capacity. An incubator brooder is a big help to the Northern poultry breeder because it makes it possible to hatch the chicks early and allows them to get a vigorous growth before cold weather comes in the fall. Consequently they commence laying earlier and become profit makers long before the usual run of hen-hatched chicks.

To obtain the best results from an incubator it should be obtained in time so that it can be filled and set going during the last half of February. By this plan the chicks should all be hatched by the last of April and if properly housed and fed will become profitable winter layers. It requires study, patience and considerable work to raise chicks artificially, but the successful management of an incubator is not a task that will seriously burden anyone of active mind and industrious habits, and is not only a time, but a money saver.

GOOD TYPE OF POULTRY HOUSE.

A good type of poultry house is one that has a good sized scratching room and a small roosting and laying room with one small window, and a tight, closely fitting door. This insures a warm roosting place in winter. In summer the tight fitting door can be replaced with one made of slats. Instead of an open shed scratching room that may fill with snow in winter a large room with two sliding windows should be provided, or a large open space left in which can be hung a muslin curtain provided the climate is not too severe.

Wire netting can be placed over this space to keep the fowls in and the windows can be opened to any width desired according to the weather conditions. This gives the benefits of fresh air without its disadvantages.

The nests should have closed hinged fronts and should be so arranged as to be accessible from the rear. This will provide the ideal laying condition by keeping them very dark. This plan of poultry house is one that should meet the requirements of the average orchardist as it can be constructed at a comparatively small cost and may be built small or large, depending on the number of fowls to be kept.

PRODUCING WINTER EGGS.

A good daily ration to produce winter eggs particularly for early hatched pullets is a scratch grain of 10 pounds of shelled corn and 5 pounds of dry threshed oats. With this should be fed a dry mash of 3 pounds of wheat shorts and 1½ pounds commercial meat scraps.

Where milk is plentiful three gallons of skimmed milk or buttermilk furnished each 100 hens daily will take the place of meat scraps. Either milk or some form of lean meat should be supplied in every ration for successful winter egg production. Barley or feed wheat may be used instead of oats. Corn meal or ground oats may be substituted for shorts in the mash. Alfalfa or clover leaves may take the place of the bran, or a good grade of tankage may be used instead of the meat scraps.

In feeding this ration all grain should be fed in deep straw to compel the hens to exercise. The mash should be fed in self-feeding hoppers or troughs and a supply kept before the birds at all times. In addition to this ration there should be an abundance of water, a supply of green food and free access to sharp grit and crushed oyster shells as well.

BREEDING FOR EGGS.

The trapnest has come to be looked upon by poultrymen with large flocks as invaluable. In order to know accurately just how many eggs a hen produces and which are the non-producers and the profitable fowls the trapnest is the best method that can be used.

One of the most valuable purposes for which the trapnest can be used is to find out just how well the best of the flock is laying in order that the good layers may be identified and mated to males out of good layers. In this way a progressive improvement can be

made in the average of the flock that will reach a high standard. The trapnesting of the breeders therefore is very important as they are going to produce the future layers.

DESIGNATING POULTRY STOCK.

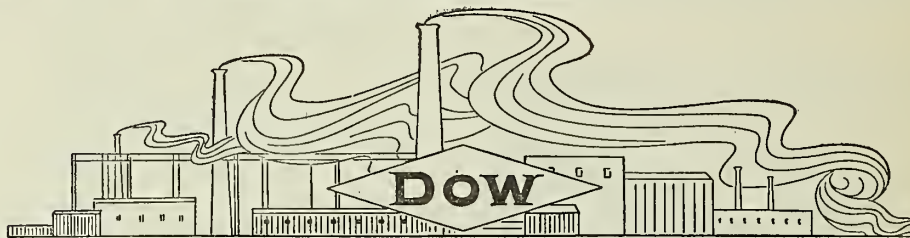
The exact meaning of the terms used to designate young and old poultry stock are often confusing. According to an expert a pullet, strictly speaking, is a female under one year old. After she has attained her full maturity she is a hen, but in the trade a fowl is spoken of as a pullet until she has commenced her first year's laying. Therefore it is said to be correct to speak of her as pullet until she is

eighteen months old or has commenced to molt. A cockerel is a male bird under one year old, but is usually spoken of as a cockerel until he has at least entered well upon his first year as a breeding cockerel.

Cocks are older males, usually having passed through one season's breeding. A cockerel should never be used to breed from before he is a year old. A pullet if she begins to lay at six months may be bred from at nine months of age.

GREEN FOOD.

It is important that some kind of green food should be supplied when fowls are con-



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lined. Any food of this kind that is succulent will serve the purpose but one of the best is sprouted oats. To provide these, the poultryman should have a number of shallow boxes which have been provided with drainage holes. The oats should then be soaked 24 hours and spread in the boxes. They should be sprinkled night and morning and fed when the sprouts are two to three inches long. A block of sprouted oats six inches square is considered enough for 10 fowls.

Poultry Notes

The right ration and warm quarters will bring the eggs.

The dark and damp poultry house often brings the roup.

Poultry relish a little moistened food in addition to the fact that it helps increase egg production slightly.

To assist in keeping the poultry house free of mites sprinkle some ashes or air-slacked lime on the floors. To kill the lice, occasion-

ally take all the roosts down and wash with boiling soapsuds.

Odds and ends from the kitchen and green foods such as cabbage, alfalfa, silage and turnips will help increase egg production. The scraps from the kitchen, however, should be sorted, banana and orange peel and mouldy bread and cake are liable to produce bowel trouble.

Drinking utensils for fowls should be kept clean and in cold weather filled with warm water several times during the day.

You should keep your dusting box in the scratching shed and not in the roosting house. The dust will settle more quickly in the shed. Fine road dust is the best for the poultry house and it must be fine enough so that any insects on the fowls will be smothered.

Now is a good time to study up on the incubator question. Incubators pay well to those who know how to handle them properly, and any person who will give sufficient time and study can learn.

Feed and care are the two essentials to the successful handling of poultry in the winter. When looking after your fowls this is a good thing to remember.

Hen manure is one of the best of fertilizers for berries. An analysis shows that poultry manure contains 2.43 per cent phosphoric acid, 2.26 per cent potash and 3.85 per cent nitrogen as ammonia and organic matter.

O. A. C. Horticultural Notes

Although yellow Newtowns and Spitzenbergs seem to bear on alternate years, proper fertilization with tillage, irrigation and pruning, produced three successive crops in orchards used in farmer-O. A. C. cooperative trials. Continuation of these favorable conditions may bring these varieties into the annual bearing class, the college horticulturists hope.

Nicotine sulphate is a powerful pepellant for tent caterpillars, but if they do eat foliage sprayed with it they are killed almost instantly. With soap added the nicotine solution is an almost perfect codling moth egg destroyer.

Not all the arsenate eaten by caterpillars feeding on sprayed foliage is assimilated, but part passes through the digestive tracts. Less is lost this way when the acid lead arsenate is used.

Peach growers bothered with peach leaf curl can get rid of it by spraying with bordeaux mixture 6-6-50. The spray is best applied between now and February 1. The trees must be sprayed thoroughly to obtain best results.

Notwithstanding the advance in the price of nursery products it is profitable to plant fruit. Pears, cherries, berries and nuts are looked upon as some of the most promising varieties to plant.

The demand for the gooseberry is increasing. With the selection of the right variety according to the section of the country they are to be planted in, gooseberries pay well and commence to yield at an early age.



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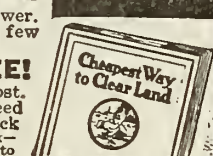
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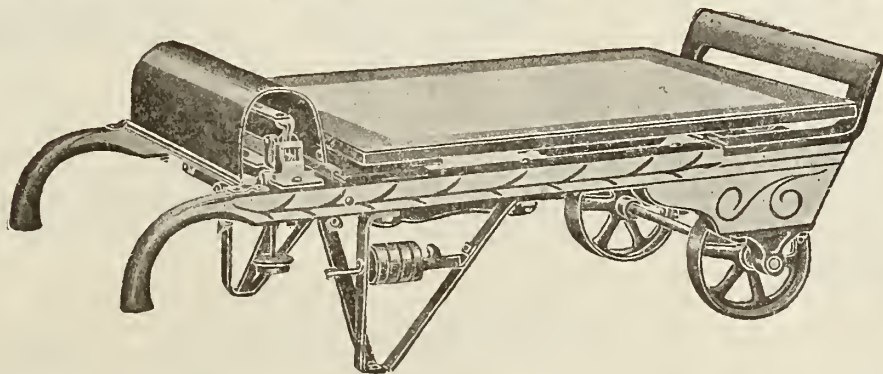
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